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SEPTEMBER 1940

1905



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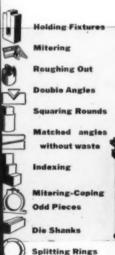
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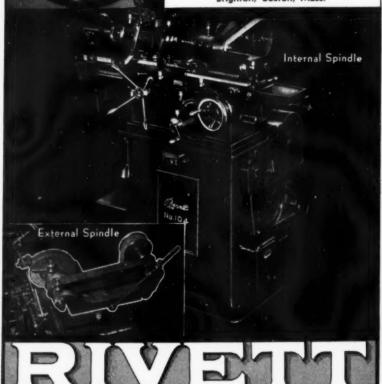
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# MACHINE TOOL BLUE BOOK

\*31.000 THIS ISSUE

SEPTEMBER 1940

VOLUME 35, No. 9

# CEA

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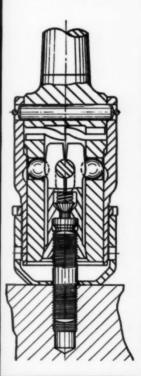
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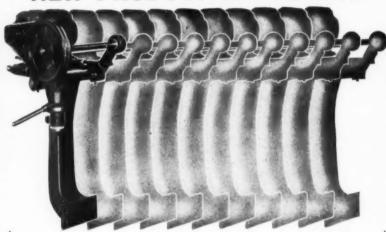
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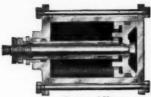
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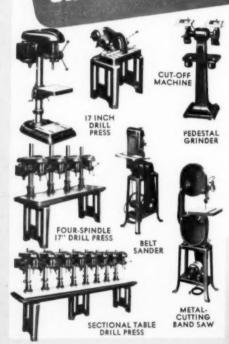




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# The Editor's Page

A LREADY, a lot of changes will be necessary in our geographies. Many small European countries have been enveloped by the Nazi hordes — losing identity, culture and liberty.

Britain alone is battling bravely against heavy odds. Headlines in the days to come will reveal how well she continues to resist the Nazi impact.

We must face realities though, and if Britain should fall, that may bring the war to our doorstep—in Canada, and the Monroe Doctrine opposes geographical changes in this hemisphere.

Our belated though ambitious defense program is under way. Nothing must be allowed to delay

its progress.

From the events that have gone before—from the lessons of the first world war, we must follow an orderly plan, analyzing and providing for every possible contingency — coordinating all of our defense efforts. Obstructions must be eliminated along with lost motion and "bottle necks."

There would be less urgency had we devoted more time and money to defense preparations—and less to "leaf raking." Then we might have been spared the spectacle of training the National Guard with wooden guns and trucks labeled "Tanks."

We'll have to develop man power, as well as machines. That means we'll all have to take off our coats and go to work. Leisure and play are all right in their places, but hardly when the country is in peril — as some of the conquered nations of

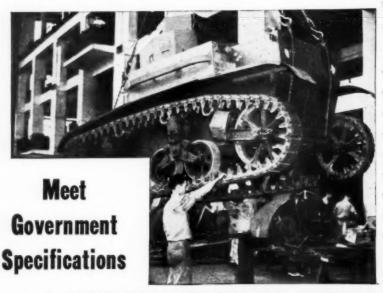
Europe found to their sorrow.

Even if we are lucky enough to keep out of actual conflict in the near future, we cannot afford to be poorly armed in a world ruled by force. At the very least, we are faced with the prospect of a bitter trade war that will tax the skill and resourcefulness of our manufacturers, competing with modern European factories and far lower labor costs.

Paraphrasing Confucius:-"No planes, no guns,

no defenses-no liberties!"

Wesley G. Paulson



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# Low Temperature Brazing

A Review of the Standard Silver Brazing Alloys Developed During the Past 15 Years and Used Extensively in Industry

> By ROBERT H. LEACH, Vice President Handy and Harman, Bridgeport, Conn.

T IS doubtful whether many persons realize the extent to which silver 'alloys are used today in brazing both ferrous and non-ferrous metals and alloys. The quantities used are small in comparison with base metal brazing alloys, but the amount of joining that is being done with silver brazing alloys is impressive, because the best results are obtained when the joints are closely fitted and a much smaller quantity of the alloy is used than is the case with the V joints or heavy filleted joints which are common to base metal brazing or soldering.

Silver brazing alloys have been used for centuries by metal workers, particuarly in the silverware industry and for making joints in cases where strength and resistance to shock were required. such as joining band saws, shrouds and lacing wire for turbine blades, and in the fabrication of equipment where appearance as well as strength was important. Usually, they have contained varying percentages of silver, copper and zinc and were called "silver solders." These compositions had melting points from 1300 to 1600° F. depending upon the proportions of the different metals, or a range below that of base metal brazing alloys, or copper welding rods which required from 1600 to 2000° F.

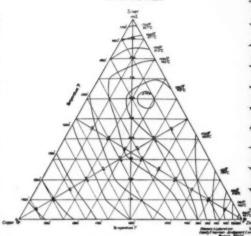
About 15 years ago, the industrial use began to show considerable increase and the interest was sufficient to cause the American Society for Testing Materials to draw up specifications for a group of standard alloys. These stand-



Figure 1—Using a small multi-flame torch for the convenient and economical brazing of small parts.

ard specifications were finally accepted and published in 1929 and are given in Ta-

The alloys are called "silver solders" in these specifications, and although this name is used widely, it is believed by many that the name, silver brazing alloy, is preferable because the term solder is likely to be construed as referring to soft solders, which are used in large quantities in industry and melt at approximately 400° F. Brazing on the other hand, suggests higher melting temperatures than soft solders and greater strength of joints which are characteristic of car these silver brazing alloys.



LIBROUS DINGONN SiLieto-Copper-Zinc Autors

The eight grades given in Table 1 were selected after a large amount of testing had been done to determine the range of compositions required to meet the different industrial requirements. The ternary diagram of the flow points of silver, copper and zinc alloys is shown above. It is evident from a study of the diagram that without some attempt at standardization, there would be a tendency for the production of a large number of different compositions with no material benefit to the consumer. In fact, one of the principal reasons for setting up these standards was to eliminate many compositions which had accumulated over a long period of time, and varied so slightly from each other that there was no justification for making all of them.

The question that immediately arises is why the use of these more expensive alloys should show such a large increase. The answer is two-fold—first, the demand on the part of those industries engaged in fabricating articles and equipment from sheet metal and tubing, for better and quicker methods of joining; and second, the comparatively low melting points of these alloys, their free flowing properties and the strength of joints made with them.

As might be expected, increase in the use of standard alloys encouraged ex-

TABLE I-STANDARD ALLOYS SPECIFICATIONS

|              | THE TOTAL ALLOTS SPECIFICATIONS |                   |                 |         |                              |                               |                              |                |          |
|--------------|---------------------------------|-------------------|-----------------|---------|------------------------------|-------------------------------|------------------------------|----------------|----------|
| Grade<br>No. | Silver                          | Copper<br>%<br>52 | Zinc<br>%<br>38 | Cadmium | Impurities<br>Max. %<br>0.15 | Melt.<br>Point<br>°F.<br>1510 | Flow<br>Point<br>F.<br>1600  | Color          |          |
| 3            | 20                              | 45                | 35<br>30        | 5       | 0.15                         | 1430                          | 1500                         | Yellow         |          |
| 4 5          | 45<br>50                        | 30                | 25<br>16        | nil     | 0.15                         | 1430<br>1250<br>1280<br>1280  | 1500<br>1370<br>1425<br>1325 | Nearly         | white    |
| 6            | 65                              | 20                | 15              | nil     | 0.15                         | 1280                          | 1325                         | White          | wittie # |
| 8            | 80                              | 16                | 4               | nil     | 0.15                         | 133 <b>5</b><br>1360          | 1390<br>1460                 | White<br>White |          |

(a) The addition, not to exceed 0.50 per cent of cadmium to assist in fabricating Grades No. 1 and 2 shall not be considered as a harmful impurity. tensive research and the development of other silver alloys for brazing. There was a demand for alloys with even lower melting points without sacrificing strength or the free flowing properties of the standard alloys. Moreover, there are certain corrosive conditions where the presence of zinc might be harmful, and in other cases copper might be undesirable. The result has been that we have available today, silver brazing alloys, in which other metals, such as cadmium, manganese, tin, nickel and phosphorus are used to give special properties.

Some of these alloys have been patented but they are used to such an extent both in this country and foreign countries, that any article dealing with the development of silver alloy brazing would not be complete without mention of the characteristics of some of them. The silver copper eutectic which contains 72% of silver and 28% of copper melts at 1435° F. and is used when zinc in the alloy would give trouble. Alloys containing silver, copper, manganese and those with a further addition of nickel and silicon are used for similar purposes. Zinc or zinc and cadmium combined with relatively high percentages of silver provide a series of alloys that melt at temperatures between 1300° and 1400° F., have a white color and are used for those conditions where copper would be objectionable. A patented alloy containing silver, copper, zinc and cadmium which flows freely at 1175° F., is used extensively for joining both ferrous and non-ferrous metals and alloys, because it flows very freely at this temperature, and makes strong joints. Another patented alloy contains silver, copper and phosphorous and flows freely at 1300° F. Phosphorous makes the alloy self-fluxing to a considerable degree and it is with copper and copper base alloys, but it is not recommended for steel or iron because of the brittle phosphide of iron produced in the joint.

Figure 2—Application of a large two-flame No. 10 tip for heating a large flange assembly,

### Selection of Grade and Form of Brazing Alloy

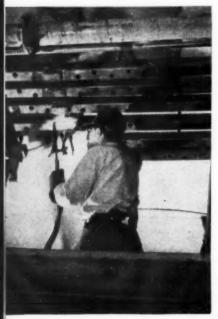
There is no definite rule to follow in selecting the grade of silver brazing alloy, as several different factors have to be considered, among which are: metals to be joined, corrosion conditions, type of joint and stresses that may be applied.

In the standard silver copper zinc series given in Table 1, the silver content will run from 10% to 80% and those with the lower percentages of silver have the highest melting points and contain relatively high percentages of zinc. These low grade alloys cost less per unit but it must be remembered that much of the advantage from the use of a silver brazing alloy is lost, because of the high temperatures required to melt them. It should also be emphasized that the lower first cost of the alloy does not mean that the total cost of making the joint will be less. By taking proper care in the design and fitting of the joint, such a



small amount of alloy is used, that the saving in time and fuel will more than offset the higher cost of a more expensive alloy with lower melting point. There is also a much greater margin of safety from damage to the metals when the alloys with lower melting points are used.

As far as melting point is concerned, a silver copper zinc alloy containing 10% silver does not have any material advantage over the common brazing or spelter alloys, but it contains about 12% less zinc and as it is malleable and ductile, it can be rolled into thin strips and drawn into fine wire. It is sometimes used when quenching at temperatures of about 1300° is done after joining, and with copper and copper base alloys when first cost seems to be the controlling factor, and it is felt that the heating will not cause excessive grain growth or other damage.



The 20% silver alloy in this group is used on copper and copper-base alloys, also on steel and dissimilar metals. It has a yellow color and as it flows freely at 1500°F., it can be used for brazing extruded bronze when reasonable care is taken in heating the joint-

With 30% of silver and above, we obtain more benefit from the low melting\* temperatures due to the silver content and we can use a lower percentage of zinc. Alloys containing from 40 to 50% of silver and from 25 to 16% zinc areprobably the most widely used of the silver copper zinc group. They are used. on ferrous and non-ferrous metals and alloys, and melt at temperatures around... 1400° depending upon the exact composition used. An alloy containing 50% silver, 34% copper and 16% zinc is a standard that has become generally accepted in place of a number of other alloys of aproximately this composition that were made before the A. S. T. M. standards were established.

The alloys in this series which have the lowest melting points, contain from 60 to 65% silver and are white in color. Silversmiths use these grades and with 15% zinc, they melt at 1325°, and are used in other industries for joining small parts and light weight tubing and sheet.

When even greater ductility is required, the silver can be further increased and the zinc lowered and an alloy containing 80% silver, 15% copper and 4% of zinc is used for joining copper rods that are to be drawn into fine wire and also for making trolley wire.

Silver brazing alloys have a higher electrical conductivity than base metal brazing alloys and their use is therefore particularly desirable for brazing parts of electrical apparatus where the highest conductivity is required. Zinc tends to lower the conductivity and the silver copper eutectic previously mentioned has about 70% of the conductivity of copper.

Tests by Reed and Edelson showed that with lap joints having a lap 1½ times

Figure 3—Brazing of a bus bar assembly. Ground connections and cable joints are also made.



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the thickness of the copper bar joined. the resistance was less than that of the copper bar, and with butt joints, the resistance was only increased slightly. The alloy used in these tests contained 50% silver, 34% copper and 16% zinc and by using an alloy with a higher percentage of silver and low zinc, the resistance would be less.

Any of the standard silver brazing alloys are resistant to most of the common types of corrosion. When unusual conditions have to be met it is desirable to make up specimens and subject them to the actual conditions of use in order to determine the best alloy. Galvanic corrosion is a problem, but as it is generally in proportion to the areas exposed to attack, a cathodic joining alloy would give the best result. Silver alloys with high percentages of silver are cathodic to many metals and alloys used to resist corrosive conditions and therefore are satisfactory for use under such conditions. For example, these high grade silver alloys are cathodic to Monel metal and stainless steel under many corrosive conditions for which these metals are used. They should not be used, however, for joining stainless steel when the joints are likely to be attacked by nitric acid.

In addition to the standard silver alloys, the engineer has a further selection from the proprietary alloys that have been developed and the two that were described in previous paragraphs are suitable for a wide variety of applications. Their low melting points have made them very acceptable because of the speed at which joints can be made and the large factor of safety against damage from over-heating.

The question of color match with different metals and alloys is often raised. Those silver brazing alloys with low percentages of silver are yellow and the color becomes whiter as the silver is increased. Alloys without any copper and high silver are the whitest, but the band of brazing alloy which is visible in a properly fitted joint is so narrow that any slight difference in color is generally a negligible factor.

Having selected the grade of alloy,

the question of the form that is best suited for any particular application is most important. The malleability and ductility of silver brazing alloys allow them to be produced in any form that will be most convenient and economical

There is a rapidly growing use of inserts of these alloys because by preplacing them before heating the following advantages are obtained:

- 1. Control of the amount of allow
- used, thus eliminating waste. Better assurance that the alloy will be properly distributed over the joint surfaces and all parts will be wetted.
   The appearance of the alloy
- at the edge of the joint is a good indicator that the joint has been heated sufficiently to insure a good bond.
- In furnace or salt bath heating, inserts are necessary, and it is possible to make up assemblies having a larger number of joints that can be heated at
- the same time. When the heating is done with torches, the workman can give his whole attention to apply-ing the flame evenly and care-ful control of temperature. Neatness of joints and no spills
- of the brazing alloy on the surface away from the joint.

Inserts may be thin sheets, washers, and rings of either round or rectangular Filings or powdered silver brazing alloy can be spread along the joint.

A thin layer of the alloy can be flushed over the joint surface of one of the members before assembling.

The size of wire or strip selected when the workman has to feed it into the joint is not always given the attention it deserves. If wire or sheet of too large a cross section is used, there is likely to be a waste of the alloy, and if it is too small the workman is inconvenienced by having to feed in too great a length. Care in choosing the right size will result in lowering costs and making better and neater joints.

### Fitting, Cleaning and Assembling

Procedures for using silver brazing alloys are given in detail in the different papers listed at the end of this paper, and only a brief summary will be attempted.

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Silver brazing alloys flow freely into narrow openings and clearances of a few thousandths of an inch should be maintained to produce the strongest joints. Fig. 4 illustrates the effect of joint clearance on strength. The surfaces of the joint should be clean, and free from all grease, dirt and oxide scale.

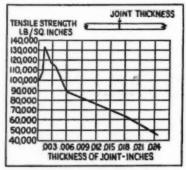


Fig. 4—Relation of joint thickness to tensile strength based upon butt joints of stainless steel.

The important point to keep in mind is that we must have a clean, nascent metal surface, that will be wet evenly by the brazing alloy. Any film that prevents the wetting of the joint surfaces will prevent a strong bond. After all grease has been removed, the surface can be cleaned with emery cloth or pickled with a suitable solution to remove any scale or highly polished surface that has resulted from rolling or drawing. Webber, in an excellent paper on Electric Furnace Brazing, explains fully the difficulties of trying to get brazing alloys to flow on highly polished surfaces and a slight roughening by either mechanical or chemical means is a great help to good bonding.

When joining flat members either with lap or butt joints, it is desirable to grind or machine the surfaces of the joint so that they may be held parallel and equidistant from each other. If thin sheet inserts are used the parts should be clamped together with enough pressure to hold them firmly

together after the alloy has melted.

When tubular members are joined, this presure cannot be applied and there is nothing to break down the surface. tension of the molten alloy and cause it to flow except gravity and capillary action. It is in joints of this type that the preparation of the joint surfaces must be given particular attention in order that the molten alloy will wet them and spread evenly. If the space is too great, the capillary action will not be sufficient to cause proper spreading and if the surface is not wet with the alloy this action is also ineffective. Unless care is taken to prepare and fit joints of this type, parts of the surface may become wetted and the brazing alloy will flow through in irregular channels and even form a fillet at both ends of the joint, thus giving the appearance of a good bond when actually, only a very small portion of the joint surfaces are bonded together.

After the members have been fitted and cleaned properly, the joint surfaces should be protected with a film of flux. This flux must be fluid and chemically active at the melting point of the brazing alloy and be spread over the entire surface. It is also advisable to protect the brazing alloy with flux when it is fed into the joint.

Borax or combinations of borax boric acid used, and are prepared fluxes that specially fluid and active at lower temperatures are available, and are preferred for the lower melting point allovs. These proprietary fluxes are composed of chemicals that dissolve refractory oxides readily, and should be used with stainless steels. A flux that has been particularly successful for use with silver brazing alloys is supplied in paste form and can be brushed along the joint to insure proper coverage.

Jigs should be provided to hold the parts in proper relation during heating. Some types of assemblies require little support but the members should be held together firmly so that no strain will come on the joint until it has cooled to a temperature well below the melting point of the brazing alloy. When the necessary care is taken in

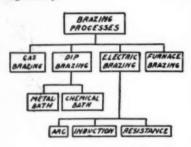
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BROWN & SHARPE CUTTERS supporting the joint members, the workman is free to devote all of his attention to applying the torch flame and he can do much better work in less time.

Heating

There are several different methods of supplying the heat necessary for brazing, and the chart given in Fig. 5 was adopted by the American Welding Society.



These different methods of heating are also described more fully in the appended list of papers and only gas brazing will be discussed to any extent at this time.

Gas brazing includes all combinations of torch brazing such as oxyacetylene, oxyhydrogen, oxygen and city gas, natural gas and gases such as butane or propane; also air acetylene and air with

other gases mentioned.

The air gas and air acetylene torches will give satisfactory results with small parts and the large torches or those with multiple flames may be used on fairly large work. However, the tendency to use an oxidizing flame in order to heat the work quickly with air torches is one of their disadvantages for use with silver brazing alloys.

Fortunately we have the oxyacetylene torch which has been highly perfected and can be obtained in a great variety of sizes and types. It is probably the most widely used torch where rapid heating is an advantage, and it has great flexibility in the hands of a skilled operator.

Because of the high temperature of the oxyacetylene flame, there is no

need for the operator to be tempted to run it on the oxidizing side, and hecan obtain all the heat required and still keep to the softer flame a little on the reducing side of neutral. might be compared with the modern eight cylinder automobile engine, and \*\* the air gas torch with the old two cylinder engine of years ago. There may be some basis for the argument that an unskilled operator can do less damage with an air gas torch, but what we are really concerned with when brazing with silver alloys is an effective means for quickly and evenly heating the joint with a neutral or reducing flame. Of course, care must be taken in the use of the oxyacetylene torch to keep it in motion and not let it play too long on one spot, but an intelligent workman will soon master the proper technique and he then has an instrument that will enable him to control the heating most efficiently.

Large units can be installed for supplying the oxygen and acetylene and a portable small units are made for small plants or field work. Servicing a and supplies can be obtained quickly

in all parts of the country.

The manufacturers of oxyacetylene torches are always willing to cooperate in the design of special tips or torches with multiple tips to meet any specific requirements.

They can be used for such extreme conditions of heating as the silver alloy brazing of fine wires in Fourdinier screens on the one hand to brazing 42" in diameter flange joints on the other.

Figure 2 shows a two flame No. 10 Tip heating a large flange assembly and 1 Fig. 1, a small multiflame torch for small parts.

To obtain the full benefit from these low temperature silver brazing alloys, the workman should be trained to observe the rate at which different metals become heated to the brazing temperature and give particular attention to the relative mass of each of the members that is being brazed. Metals of high heat conductivity, such as copper, should be preheated some distance from the joint and if there is much difference in the size of the parts



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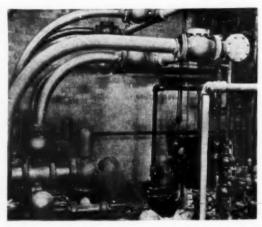


Fig. 6—A typical installation of silver alloy brazed piping and fittings in a steam plant.

then the one with largest cross section should be given the most heat.

Unless inserts are used, the joint surfaces should be heated to a temperature at which the brazing alloy will flow freely before attempting to feed the alloy into the joint. Although it is not advisable to keep the torch flame on the molten alloy and the expression "let the heat in the joint melt the alloy" is often used, a skilled workman can take advantage of the heat of the flame to melt the alloy, which then flows quickly into the joint. In all cases, however, the joint surfaces must be heated above the flow point of the alloy or a good bond will not be made. When the joint members vary greatly in thickness, as obtained when thin wall piping is brazed into a heavy flange, care must be taken to heat the flange until the inner surface which joins the pipe is at the correct temperature for the particular brazing alloy that is being used.

Probably one of the most difficult things that the workman has to acquire is the ability to judge when the joint is at the required temperature, and at the same time not overheat the joint. Benches placed before windows are not good places to work because of the extreme variations in light conditions and strong drafts are also bad. The appearance of the flux is a guide, but if one is using a flux that is fluid at a temperature several hundred degrees below the proper brazing temperature, the best indicator is to touch the alloy to the heated joint. In order to speed up the work there is a tendency to overheat the joint with a consequent damage and workmen should be trained to judge the heat with reasonable accuracy.

### APPLICATIONS IN DIFFERENT INDUSTRIES

### Electrical:

Transformer leads and taps are brazed with silver alloys because of the low temperatures at which strong shock resistant joints of high conductivity can be made.

Joints in bus bar installations of all kinds are being made with these alloys because of the high strength, corrosion resistance and elimination of voltage drop. Figure 3 shows a bus bar assembly being brazed. Ground connections and cable joints are also made.

In the manufacture of electric motors, end rings are bonded to rotor bars and many small parts in the manufacture of electrical equipment are brazed with silver allovs.

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### Household Refrigerators and Air Conditioning:

One of the largest new developments in the use of silver brazing alloys is in the manufacture of refrigeration units, both household and for industrial plants.

The low temperatures at which they melt and the strong corrosion resistant joints, make them particularly desirable for joining the light metal sheets and tubing which are used in this industry. Joints are leakproof and when proper attention is given to design the cost is remarkably low.

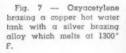
The use of these alloys in air conditioning systems is extending rapidly, and has eliminated the old breakdowns that occurred with soft soldered joints which were often serious and caused damage from the escape of the refrigerant.

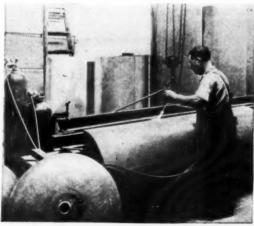
Piping:

Standard pipe and fittings up to 10" or more in diameter are now being joined in increasing volume with these alloys. Tests on joints made in this manner have not failed when the work was done properly. Special fittings

are being made with rings of silver brazing alloy fitted into grooves cut in the fittings, and this type of joint is being specified for marine and navy piping, and piping in buildings. Installations of silver alloy brazed pipe and fittings in large steam plants have been in use for several years, and have given complete satisfaction. Fig. 6 shows a typical illustration.

Joints made with silver brazing alloys on both similar and dissimilar metals for steam lines and boiler construction have been subjected to extreme tests entirely beyond anything to be expected in use and no signs of failure occurred in the brazed joints. One example is a steam boiler having 1237 copper tubes joined to mild steel headers 48" in diameter and 34" thick. Brazing was done with a silver alloy melting at 1175° F, and under test. this boiler was fired to 225 lbs. pressure, steam and water blown out and cold water immediately pumped into the dry hot boiler. Repeated firing and cooling showed no failure in the brazed joints. Similar tests on assemblies of heavy wall copper tubing and fittings brazed with an alloy melting at 1300° F., showed no failure when subjected to a steam pressure of 200 lbs. per square inch and followed by the in-







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troduction of cold water for many repeated cycles.

Another unusual application was the construction of underground gas mains from heavy wall copper tubing, using butt joints brazed with the silver copper phosphorus alloy, previously mentioned. Ordinarily a bell and spigot type of joint would be used and it was recommended in this case. However, the results with the butt joints were so satisfactory that they were adopted.

Standard fittings with inserts of silver brazing alloys can be obtained for pipe sizes up to 10" in diameter or larger and flanges as large as 42" in diameter. The oxy-acetylene torch has been most successful for heating joints of this type and there is every indication that this method of joining piping and fittings will show a large increase in the future.

Household Equipment:

Silver brazing alloys are being used in the manufacture of many different articles used in the home, such as cooking utensils, hot water tanks, water heaters, flat irons, metal furniture and other applications where soft solders do not give the necessary strength and the temperature required for base metal brazing alloys or welding rods would be too high. Fig. 7 shows a copper hot water tank being brazed with a silver brazing alloy which melts at 1300° F. and the heating is done with an oxyacetylene torch.

### Other Uses:

Silver brazing alloys are used in considerable quantities for the manufacture chemical equipment, dairy creamery equipment and in plants and equipment for the dye industry.

There are innumerable applications in the electrical, automotive and airplane industries where instruments, oil filters, oil coolers, gear shift levers, steering wheel spiders, contact joints, window frames, oil lines and radiator grilles are being brazed with these low melting silver alloys.

There is a suitable silver brazing alloy available for making practically every type of joint on nearly all metals and alloys that melt at temperatures above 1250° F. As engineers become better acquainted with the strong, neat

joints that can be made quickly and economically with these alloys, at comparatively low temperatures, their use is being extended rapidly into all industrial fields and they provide an effective means of meeting many of the problems in the manufacture of mod-. ern equipment.

The author expresses his appreciation to his associates for their assistance and to Handy and Harman for permission to publish this data; also to the Air Reduction Co., and to Walworth Co., for photographs. 10 "

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ruary, 1939.

Presented at the 40th Annual Convention of the International Acetylene Ass'n., Milwaukee, Wis.

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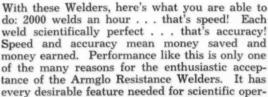
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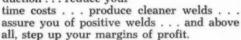
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# Fixture Clamping Elements

European Practice and Developments in the Use of Clamping Elements on Jigs and Fixtures

By P. GRODZINSKI, Consulting Engineer

IGS and fixtures usually are not standard designs as they generally have to be adapted to a special work piece for a special purpose. Consider-ations with regard to costs, handling time, weight, number of pieces to be clamped simultaneously, etc., are necessary to insure economic design. Trials of standard designs of fixtures until now, have been more successful for small and subordinate parts, whereas usually the design of an economic fixture must be adapted to the special purpose. The shape of the fixture will roughly correspond to the shape and form of the workpiece, whereby pre-cautions for easy insertion and re-moval must be made. Special parts usually fixed in the fixture body have to be provided to locate and center the workpiece. Other parts fulfill the same purpose with regard to the locating of the fixture in the machine. provisions are necessary to insure the safe conduct of the tool with regard to fixture and work piece.

Examples of this include the well known boring bushes and swinging templates for the guiding of shaping or milling tools. However, the chief elements which require a special consideration in each case are the so-called clamping elements. They are, of course, the real active elements and can be compared with the mechanisms acting in a machine. This comparison, not being absolutely true in every respect, can be carried so far, as to say that the clamping elements are the mechanisms of the fixture, in spite of the obvious fact that their action is limited and

they serve only for fastening and clamping.

A further help for this more theoretical view is, that it is the trend of today to utilize whenever possible, quick clamping elements which reduce the time for performing the closing and clamping action without interfering with the security of clamping. It may prove advantageous for the tool and fixture designer always to have in mind the various possibilities in the principle, and in the special form in which the clamping elements may be brought, in determining the best way for their use.

Table 1 gives a general survey of the clamping devices with the two main groups clamping by the action of friction and clamping by force. A third group may be mentioned, clamping by adhesion, when utilizing plaster of Paris or cements for fixing workpieces.

This survey shows that in the first group: - Clamping by friction, the greatest number of elements and therefore possibilities are present, allow-ing the designer the largest number of variations and combinations, these elements cause, owing to the friction on their characteristic working surfaces a self-locking action. which must resist any outer forces i. e. cutting pressure, weight of workpiece and even vibration. Thus, they provide a safe locking of the workpiece in the fixture. It may be noted that here an effect is utilized, otherwise carefully avoided when designing movable machine parts.

l magnet-

### TABLE 1-SURVEY OF CLAMPING PRINCIPLES

|          |       | TABLE I-SURVEY                          | OF CLAMPING PRINCIPLES   |  |  |  |  |
|----------|-------|---|--|--|--|--|--|
| General  | Group | Elements                                | Remarks  |  |  |  |  |
|          |       | wedge                                   | most primitive element   |  |  |  |  |
| Clamping | hor   | screw                                   | not quick acting unless special provisions are<br>made                                 |  |  |  |  |
| Friction |       | cone                                    | suitable for the inner and outer clamping of cylindrical and similar workpieces        |  |  |  |  |
|          |       | eccentric                               | most variable element, special quick-acting element                                    |  |  |  |  |
|          |       | toggle lever<br>springs<br>(metallic or | useful principle, for small differences in size<br>sensitive against variation in size |  |  |  |  |

| Clamping<br>Force | <b>.</b> | cir-pressure<br>fluid (oil)                  | external supply necessary external supply necessary |     |
|-------------------|----------|--|---|-----|
|                   | DA       | pressure<br>electricit <b>y</b><br>magnetism | seldom applied possible owing to new power          | lul |

|             | electro-magnetism<br>feed-pressure | steels gaining wider application            |
|-------------|------------------------------------|---|
| Clamping by | of machine tool                    | seldom utilized                             |
| Adhesion    | cements or glue wax and plasticine | seldom applicable, and then for small force |

As shown, these elements can be represented in the various geometrical shapes, as the basic form of which the simple wedge can be traced. wedge, heretofore, frequently used on fixtures, is now considered as being obsolete and therefore frequently replaced by screws or other elements, being in principle a curved wedge. more frequent utilization seems to be quite possible as the basic facts for a scientific calculation, according to the special demands, such as clamping pressure and stroke have been given recently. The eccentric can be considered as the most primitive form of a quick acting element, giving an immediate release of the workpiece after a distinct free-stroke, which is covred without any friction being pres-This is, however, a special advantage in comparison with other elements, such as wedges, screws, and cones, but it will be shown that these other elements, generally not considered to be "quick acting elements" can be so formed, respectively provided with special devices that they are also in conformity with the quick acting principle.

These remarks especially refer to wedges and screws, whereas the last element of this group is represented by the cone which serves for the internal and external clamping of cylindrical parts. In special cases, link mechanisms are quite suitable as

clamping elements. These act on the toggle lever principle, causing clamping near i. e. before and after the dead-center position. However, the angle and therefore the effective stroke available for clamping workpieces of varying dimensions (the possibility of re-adjustment through screws must be excluded when considering mass-production) is very restricted. But by means of special designs it may be possible to increase the angle between the beginning of clamping and dead center position, so that useful clamping means, according to this principle, may be designed, which according to their special characteristics can also be designated as quick clamping elements.

The spring clamping elements form a special group, as in this case only a distinct and not increasible load is exerted on the workpiece to be machined. The pressure, however, is usually underlying distinct variations, which can only be equalized by means of intermediate levers and adjusting devices.

Magnetic clamping or holding devices 'represent a new improvement since powerful magnet-steels have been evolved, such as the Alni- and Alnicomagnet steels, which are quite useful for higher working and cutting pressures.

The latest and most up-to-date of clamping elements are those using

NOTE—In the accompanying drawings, workpieces are designated by "w". "lo.p" indicates the locking piece, "a" the clamping and "lo" the loosening piece.

pneumatic and fluid pressure, in which predetermined pressure is exerted on the workpiece. This avoids distortion, and there exists no relation between clamping pressure and the tolerances of workpiece to be clamped.

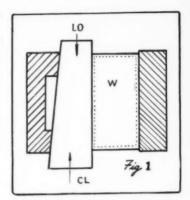
Of importance are further clamping devices with a small electric motor which operates a clamping device of high lever ratio. However, these devices hitherto have been applied only

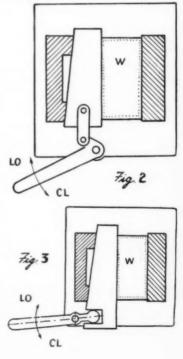
for chucking machines.

Further automatic clamping devices have been evolved which correspond to the height position of the working spindle, for instance in a drill press, holding the workpiece clamp and releasing it after the machining operation has been finished. Usually these devices are composed of friction and spring elements.

A number of questions as to the most efficient and most economical designs of clamping devices are not yet solved. During the last decade, though, good progress has been made. Unfortunately these results are seldom reported in technical papers. The intention of this survey is to give some suggestions as to the possibilities which are hidden in the great field of clamping devices. It is the task of the tool and fixture designer to evolve for any special case. the most promising solution, after careful study and after thorough consideration of all influencing factors. In practice, it is seldom that this can be obtained without a compromise.

The most primitive clamping device is the wedge (Fig. 1) which now is generally considered obsolete. That is because an additional operating element is necessary to drive the wedge in and out. This, of course, must be loose, as it must act from different sides. Further the danger exists, that the wedge surfaces may be damaged; that both fixture and work piece may suffer deformation under strong blows. All these effects may reduce the useful life of such a fixture, especially as the





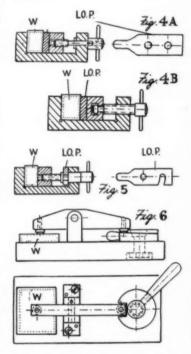
forces are not under control. If one therefore utilizes the wedge-principle, it is absolutely necessary to provide additional operating levers. In that case, useful and reliable clamping devices may be evolved (Figures 2 and 3). In such cases, excessive clamping pressure is avoided, excluding the possibility that the fixtures may be actuated by a hammer or equipped with a tube for extending the lever arm. The clamping device is actuated by a part embodied in the fixture. If the lever is actuated in one direction, the workpiece is clamped; in the other, it is loosened.

In the fixture, shown in Fig. 2, between the wedge and the swinging lever, a small link is provided. This is eliminated in Fig. 3 by the rounded end of lever engaging directly in a rectangular slot in the wedge. In cases where, during machining, considerable vibration is encountered, for instance when high clamping forces are exerted as in the case of milling and turning fixtures, the high self-locking properties of screws are of value. Usually several full rotations are necessary for the clamping, as well as for the release.

There are a number of ways of changing the simple screw drive into a quick clamping element, as required today. Relatively primitive is the application of C-washer and drop-plates, arranged in front of, or behind the pressing plate Figs. 4a and b). Drop-plates also can be arranged easily at the screw collar (Fig. 5). After the screw pressure has been released, i.e. after ¼ to ½ rotation of the screw, the drop plate can be swung away. The work piece is then free and the screw spindle with the clamping plate can be brought backwards in any desired position.

Besides the usual screw clamps with standard threads, special threads involving only a single helical thread (one cam surface) are used. When utilizing such a design, the single thread has to be interrupted at the lowest position to allow the lifting of the clamping or pressing part from the workpiece. For

the quick approach, an inclination of 30° to 45° may be useful, whereas the real clamping range may, of course, be provided with a low inclination angle, usually not exceeding 5° to 6°, corresponding to a friction coefficient of about 0.1.



The combination of screw and wedge sometimes has been very successful. Such combinations are used, for instance, on chucks for turning lathes. An example is the well-known mechanial Forkardt chuck. The basic form of a quick clamping element is the spiral cam, frequently used in the form of an eccentric. This designation, of course, is only applicable for parts which are limited by a circle or a part of a circle. The cylindrical form is

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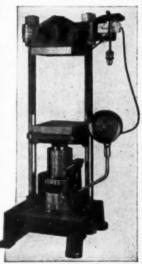
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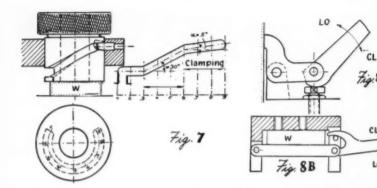
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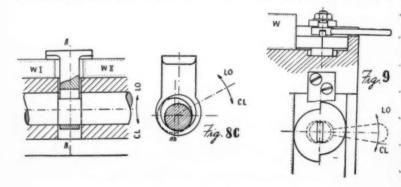


permissible for clamping ranges of 60° to 90°, i.e. the actuating lever of the eccentric during clamping, should not exceed relative positions under 60° to 90° when clamping workpieces in the permissible range of limits. Otherwise trouble will arise, i.e. in cases where the center point comes in the dead center position and nearly to it. In such cases, a very high pressure is exerted on the workpiece.

One can distinguish between three basic forms of the element, between which great differences exist, not only with regard to their shape, but also as to clamping pressure, allowable height differences, and clamping security. These different forms are:—eccenity.

tric (direct acting), hook eccentric and eccentric shaft (Figs. 8a, b and c). The last mentioned design allows the highest pressure to be exerted and gives the highest ciamping range (allowable limits of the pieces to be safely clamped.) The hook eccentric is only suitable for relatively small pressures and clamping ranges. The application of this design is therefore almost restricted to drill jigs for the securing of cover plates, etc. The performance of the eccentric (direct acting) according to Fig. 8 is intermediately between that of the elements already mentioned.

The eccentric shaft, Fig. 8, can be manufactured easily on a usual turning



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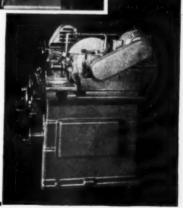
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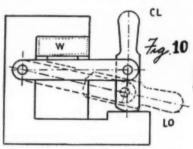


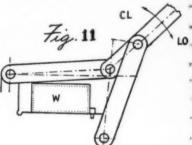
lathe. For the eccentrics according to Fig. 8, cylindrical discs with a hole eccentrically situated, can be applied, being welded or screwed on rods serving as handles. Further special forms of the elements can be developd, meeting special conditions. This, of course, can be considered as a special advantage of the spiral cam.

As an example of this, in Fig. 9, a spiral cam element is shown, producing the double stroke of a usual eccentric. The eccentric has double cam surfaces, from which one is in contact with a stationary surface, the other being in contact with the workpiece. In this case, however, the axis of the eccentric is caused to perform a sidewise movement, when the eccentric is

acting eccentrics, of which Fig. 10 is an example. This special fixture is somewhat high, thus reducing its stability, as with regard to a suitable aperture for inserting and removing the workpiece, a special form of eccentric had to be selected. But, also, in this case, the true eccentric formhas proved successful.

Fig. 11 represents a clamping device, outilizing members connected by links. This are true mechanisms and they are most frequently utilized for work pieces with small differences in size, almost, sheet metal. Clamping mechanisms similar to those shown are in frequent use for the clamping of sheet metal parts of motor car bodies during welding and brazing. The clamping



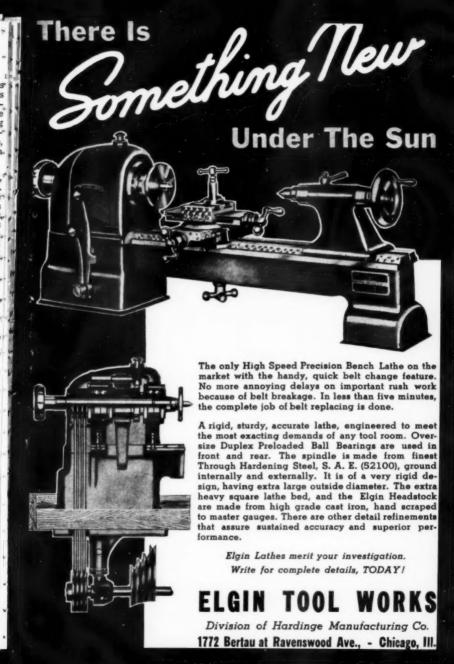


pressed like a wedge between the fixture body and the work piece. For this case, a longitudinal slot is provided in the fixture body, allowing a sideways movement of the cylindrical hub of the eccentric. The actuating lever is separated from the eccentric and rotatably mounted in a kind of bridge. It fits with a slot in a rectangular projection of the eccentric.

Direct acting eccentrics are usually mounted on a fixed axis, whereas the hook eccentrics are situated on swinging cover plates, etc. These simultaneously serve for the locating of the workpiece and support boring bushes, etc. This method, of course, is not always considered to be a satisfactory one (Fig. 8b). However, similar arrangements can be provided on direct

pressure can become very high with these devices, owing to the toggle lever action.

In cases where the clamping pressure should not exceed a distinct margin, spring clamps have been quite satisfactory. When applying a spring, it is only necessary to provide a device to compress or release the spring pressure on the work piece. In Fig. 12, a fixture is shown in which the spring pressure is generated for the clamping and released for the unclamped position. The spring tension bolt ends in a kind of hook with which a pin on the hand lever engages. When the hand lever is depressed, (as shown) and the lever is brought in the dead. center position, the spring obtains the



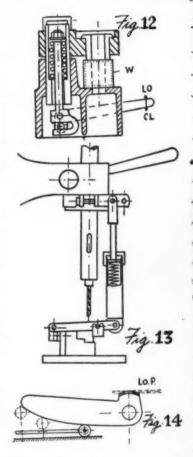
necessary tension. On more primitive devices, the spring is given free for clamping and is retained under higher pressure when the workpiece is to be exchanged.

Also in connection with the movement of the tool spindle, spring pressure devices are used, thus utilizing a part of the feed pressure to hold the work piece down. In such cases, the spindle of the drill press is connected with a spindle pressing on a spring bolster, combined with the cover plate of the fixture. When the boring tool is fed against the workpiece, the cover is pressed strongly against the workpiece.

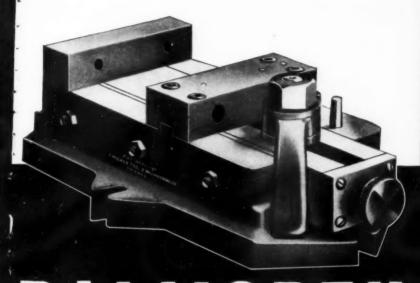
Too strong and too rigid clamping may cause eventual deformation of fixture and workpiece. These disadvantages are not encountered with compressed air and oil clamping devices. The workpiece is elastically held, provided the clamping surfaces are properly designed. The complication is that compressors and pumps are necessary to generate the air-or oil-pressure. Simple devices are also known in which the oil-pressure is generated by simple screw drives. In a number of cases, the piston can, owing to its size, not be directly arranged near the clamping point. In such cases, pulling or pushing bars are utilized, as well as bell-crank levers with a distinct lever ratio to exert a higher or lower pressure on the work piece, than is provided by the pressure piston. In distinct cases, the elastic action of the oil or air-bolster is not desired, as the work piece should always be clamped with a distinct pressure, independent of the pressure in the cylinder. In this case, a self-locking device is included, between piston and workpiece. An example, shown in Fig. 14, represents a device in which the pressure can act backward from the piston, on a very reduced scale.

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## New Tools For Defense

Indorsed by Industry, the Versatile Bending Press Is an Important Tool in the Defense Program

By CYRIL J. BATH, President, Cyril Bath & Co., Cleveland.

In twenty years, new tools and technical processes have considerably changed the art and weapons of war. In the fabrication of such, as ships, planes and shells, gun carriages and tanks, steel kitchens and armored cars, the process of welding has been a revolutionary and valuable innovation, as indeed it has been in the whole mechanical field. It has saved weight, reduced cost and added strength, and given us structures, as in marine engine bases, more resilient and less lia-

ble to damage from shock of shell and bomb.

The welding process has itself, developed tools particularly adapted to its service, and to the design that welding practice involves In addition to the actual welding and cutting tools, the most significant new machinery has perhaps been the bending press. In the last world war, there were no bending presses such as the modern machine shop uses. There were cast iron brakes, or folding presses, developed





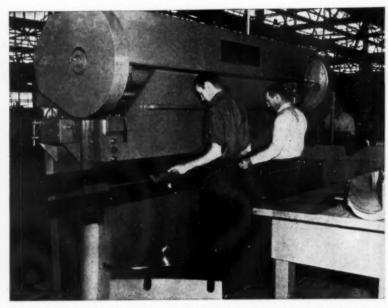
(Left) Special operations with a louvring die, together with samples of the work produced—(Right) A typical forming operation showing details of the dies.

| $\theta$            | 8  | B   | A.   | <b>V</b>   | A        | 7 | 8 | 8 | Secure comme |
|---------------------|----|-----|--|------------|----------|---|---|---|--------------|
| 0                   | A  |     | 8  |            | B        |   | B | 8 | 2            |
| Character Character | 8  | B   | 8  |            |          |   | 8 | 8 | 8            |
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| J. man              | \$ | 0   | 0  |            | B        | A |   | 8 | MITTER       |

Here are just a few of the innumerable jobs that may be handled on a modern Press Type Bending Brake.

these pages for future reference. These typical jobs may suggest solutions of bending problems.

| B.  | B | (Z) I |  | B.          |            |     |   |   | <b>€</b> !   |
|-----|---|-------|--|-------------|------------|-----|---|---|--------------|
| P   |   |       | E !  |             |            |     |   |   |              |
| B   | D | 8     | 55   | W.          | <b>B</b> : | B   |   | <b>n</b> :  | 0            |
| B.  | B | P     | S:   | San January |            | 0   |   | 80  | Si           |
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| D   | B | Smili | A seed of the seed | 0           |            | Ø ä | 5 |   | About day    |
|     |   | Sum.  |  |             |            |     | 0 | D   | Was to       |
|     | 图 | MKW.  | A  |             | 1          | 8   | G |   | Aut Small    |
| 3   | 3 |       | Y. 51600   |             |            | 1   | 0 | Constitute of the state of the | LANGE FLANCE |
| SA. |   | A     | D.E.   |             |            |     |   | Trees And   | Anna Court   |



Bending operations at a prominent aircraft plant, forming modulated as well as conventional bends with rubber and steel dies.

principally for the bending and forming of sheet metal, but the modern allsteel bending press, or brake, was not developed until after the war.

Its first usage was also in the working of light sheet metal, but as its possibilities became more apparent, and the art and demands of welding design progressed, mechanical bending presses soon began to appear in sizes large enough to bend 1" plate cold, and to work such plates in lengths up to 30 feet. Such monsters, however, were infrequent, the average shop finding that a shorter tool with a deep throat in the frame through which the work could be passed, was a more practical installation. As an instance of such use, one manufacturer is making stainless steel ship masts for the Navy that are 72' long, having vertical welds. These long bends are made on a press that is only

12' on the die surface. This is done by passing the work through the gap, as in a gap shear.

Very early in their use, manufacturers of truck bodies found that a bending press would bend up a piece of plate, including reinforcements at the edges, into a lighter, stronger and neater body. Stakes and attachment parts and the end panels were then welded in, and the old cumbersome assembly of angles, channels and rivets disappeared in a cloud of high cost. As war preparations became more imperative, the same applications which became sound for truck bodies were generally adapted to armored cars and Very rapidly, manufacturers trucks. who adopted welding found that the bending press would give them all manner of shapes, almost as readily as their designers could cut out cardboard

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and bend it into drafting room models. And they found too, that a bend can have sound structural contours not without their sales value. This streamlined appearance of the new, redesigned bent and welded products looked better, and, most charming of all, it sold better. They found too, that bends cost less than welding, or bolting, or riveting, and this was nothing to lie awake about in a hard world.

Having won a firm foothold in the mechanical industries, it is not surprising to find that there is a wide application in wartime production. First on the list came the plane manufacturers from every country. The bending press was a "natural" for their needs. with its long, narrow bed, its adaptability to forming all manner of shapes, or for punching or blanking, or for multiple operation work. The Navy was among the first to see the uses of bending presses in everything from steel furniture to kitchen fittings, from Diesel engine bases to ship masts and spars. Tank manufacturers found that the modern heavy bending press would perform difficult jobs in straightening and forming armor plate, and the new cargo ships are an excellent illustration of the combined use of the welding process and tools for bending and forming the sections before they are assembled. Most of the designs for gun carriages and anti-aircraft mountings have taken into consideration, similar applications. No manufacturer can hope to point out all the varied uses to which industry is adapting bending presses in war work, but outline drawings like those shown will give a general notion of the wide variety of shapes that can be produced. easily and speedily, and shapes of this character enter into a wide variety of war requirements

NOTE—A second article on the use of bending presses will apear in an early issue

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Lift jacks and lift jack platform trucks are illustrated and described in the first eight-page section of the new loose leaf catalog of All Steel Welded Truck Corp., Rockford, Ill. Many helpful hints and ideas on material handling problems are given.

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# Identifying Cutting Tools

A Simple Marking System Particularly for Carbide Tools Which Assures the Right Grade for the Job

By LEO J. ST. CLAIR

N ORDER to realize the utmost from cemented carbide tools, it is often necessary to use several different grades. A definite and positive method of tool identification becomes necessary, because it is important to know at all times, just what grade of cemented carbide tip is on the tool. Since there are a number of suppliers of cemented carbides in this country, it is also important to keep track of the tools by manufacturer so as to compare the respective cutting qualities of the carbides supplied. For these reasons, a new and novel method of cutting tool identification has been worked out by the General Tool & Die Corporation, East Orange, N. J.

#### No Place for Guesswork

During my 14 years of experiences with the engineering development, sale, and application of cemented carbide tools, I have seen countless instances of applications of the wrong grades of tools to jobs, the complete loss of identifications of the grades of carbides and the resulting loss and confusion resulting from such cases.

Poor results obtained due to this loss of grade identification has often discouraged users of carbide tools. Manufacturers of the tools stamp the grades of carbide tips on the sides of the shanks. Sometimes, the stamped sides of the shanks must be ground off so that the shanks will fit into the holders. This results in the loss of grade identifications. Sometimes the shanks are cut off, and again the grade identifications are destroyed. In many cases, the sides of tools become so worn, through long and severe use, that grade identification becomes difficult or im-

possible, because stamped numbers and letters are no longer deciperable. Users of carbides that make their own tools, often do not stamp or identify the tools. Frequently several grades and brands of carbides are in use in such plants. It is only natural that the wrong grade of carbide is often used, with discouraging results.

When the Worthington Pump & Machinery Corp.'s management decided to use carbides more extensively in 1937. Harry S. Wilcox, their Tool Engineer, decided on a novel method of identification. He decided to paint the shanks of all carbide tools and also to stamp a tool identification number on each. A record was kept of each tool, using the same number on the record as stamped on the tool shank. This record identified the tool as to grade, style, use, and manufacturer of the carbide. Small, circular colored paper discs were used to keep track of the tool in the tool room, in the grinding room and in the shop These discs carried the same numbers that appeared on the tool shanks. The tools were checked out in much the same manner as gauges, cutters, etc.

Shop Records

The paper discs were of various colors. Red was used to indicate that the tool was in the shop. The tool identification number was written on the disc as well as number of the machine on which the tool was being used. White indicated that the tool was sent to the grinding room to be ground. Green indicated that the tool had been sent to the tool room for repairs. These discs were hung on small nails below the spaces assigned for each of the carbide tools.

Before deciding on the type of paint to be used, much experimenting was done with different paints and lacquers. The paint or lacquer used had to resist the action of various cutting oils, and also have the ability of withstanding considerable abuse. Finally, Glidden's quick drying "Lacq" was decided on. A bright red color was used on the Tungsten Carbide group, and a bright green color was used on the Titanium and Tantalum groups of carbides.

Experimental tools were painted blue and streaked with red or green to identify the carbide. These tools were watched carefully by the foreman for he had to turn in a report on their performance. Once accepted, they were painted in the usual way.

Thoroughly Tested

This tool coloring identification system has been in use at the Worthington plant since 1937, and has assured constant, easy, visual identification.

The basic principles of tool identification described, have been used by the General Tool & Die Corp., for the identification of their tools. This system has been worked out so that it will be easy for any plant to adopt it. The system should have general appeal in that the method used insures a simple and easy method of keeping track of all the information necessary in regard to various carbide tools and other alloy tools.

This Company uses two general methods of tool identification: — 1st, color and 2nd, printing Most of the tools have two colors:—one, the main body color; and the other, a secondary end color. The main body color identifies the types of cemented carbides. That is, whether for use on iron, nonferrous material, etc., or for use on steel.

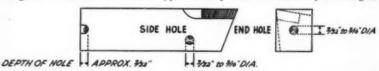
The secondary end color identifies the grade of carbide within each type.

All of the grades within the Tungsten Carbide group (for use on iron, nonferrous metals and compositions) are identified by a bright red color as the main body color. All of the grades within the Titanium or Tantulum Carbide group (for use on steel) are identified by a light blue color as the main body color. The secondary end color designates the grade within each group. For instance, a tool with a grade 2A3 tip which is used for heavy duty cuts on iron, would have a red main body color and a white secondary end color, while grade X, used on light and medium cuts on clean steel castings and forgings under .40C would be identi-fed by a light blue main body color and a black secondary end color. The secondary end color covers from 10 to 20% of the total shank surface, depending on the size of the tool. tabulated chart shows the colors used for the various grades of the "new process" Vascoloy Ramet.

You will notice that the chart gives the Glidden's lacquer number for each color, so that it is easy to adopt this method for plants making their own tools, or for plants buying tools from various manufacturers.

#### Permanent Identification

As an additional safeguard, two small holes are drilled in the shank of the tool. One is on the side of the shank near the front end, and the other hole is drilled in the end. These holes are from 3/32" to 3/16" in diameter and about 3/32" deep. When the tool is When the tool is painted, the paint fills up these holes and it becomes next to impossible to lose the identity of the tool even though every trace of paint is worn off the side and end areas of the shank. The hole at the side of the tool will have the same color as the main body color used, while the hole in the end of the tool will have the same color as the secondary end color used. By referring to



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the color chart, the identity of the tool is ascertained. The sketch illustrates the use of the holes

This method of tool identification can also be used to reveal the manufacturer of the carbide tip. You will recall that a hole is put into the side of the tool and the end of the tool. If a company were using carbides from three different manufacturers, it would be simple to drill one, two, or three holes at the side and end of the tool. One hole in each place would mean manufacturer Two holes in each place would mean manufacturer "B," and three holes would indicate manufacturer "C." Since the grades of carbide made by each manufacturer correspond to other manufacturer's grades, it is easy to insert the name of other manufacturers

on the color chart given. For instance, the "new process" grade 2 A 68 from Vascoloy Ramet, corresponds to Grade 44A of the Carboloy Company, grade HB of the Fifth Sterling Co., and Grade K-65 of the Tungsten Electric Co.

This system of tool identification has met with ready response in the field. It can be adapted easily by firms making their own tools since the Glidden Company's "Lacq" numbers are given on the chart. It can also be used to easily identify the manufacturer of the carbide as already described. The small amount of effort required to operate the system will be balanced by the benefits. It enables a foreman or a supervisor to identify a tool clamped in a machine. If he sees a red shank

| Grade | Rock A    | 7.2.5.  | Watere of Cat  | Hais<br>Body Color | Secondary<br>End Color |
|-------|-----------|---------|--|--------------------|------------------------|
| 2A3   | 89.3      | 290,000 | Heavy Duty Cuts: 3/32* feed<br>or more on iron. (1/16* feed<br>on bad steel casting.)  | Red (2009)         | White (2000)           |
| AT    | 91.0      | 240,000 | Hedium Heavy Cuts (up to1/18° feed) on tough alloy irons at comparatively low speeds. (semi-finish cuts on bad steel cast-ings.)   | Red (8809)         | Yellow(2015)           |
| 2A68  | 91.1      | 245,000 | GENERAL PURPOSE ORADE for Iron and Non-Ferrous Metals. Medius Heavy Cuts (up to 1/18* feed) on pure Iron or semi-steel. (light roughing cuts on bad steel castings.)     | Red (2009)         | None                   |
| 2A5   | 92.0      | 225,000 | Light Cuts (up to 1/16* deep a 1/64* feed) on all types of iron. Roughing cuts on low tensile atreage. som-ferrous alloys and compositions.                              | Red (2809)         | Black (2010)           |
| 2A7   | 92.5      | 200,000 | Light Cuts (up to 1/32° deep & .010° feed) at high speeds on all types of iron, non-ferrous alloys and compositions.   | Red (2009)         | India Buff(mos)        |
| 289   | 92.9      | 190,000 | Very Light Cuts (up to .005° deep & .005° feed) on all types of iron, non-ferrous alloys, and compositions.  | Red (2000)         | Greeh (#15)            |
| GRAD  | ES FOR S' | TEEL.   |  |                    |                        |
| XX    | 88.4      | 260,000 | Heavy Duty Cuts (up to 3/32° feed) on clean steel castings, and forgings, and on straight Carbon Steel under .40°  | Blue(2819)         | Yellow (Sel5)          |
| x     | 90.0      | 240,000 | Light and Medium Cuts (up to 3/64* feed) on clean steel castings and forgings, and on straight Carbon Steel under .40C   | Blue (2819)        | Black (2010)           |
| EE    | 90.5      | 275,000 | Heavy Duty Cuts (up to 1/18"<br>feed) on all alley steel<br>forgings or shafts, and on<br>atraight Carbon Steel above<br>.40C  | Blue (2819)        | India Buff(2002)       |
| EM    | 91,2      | 255,000 | GEMERAL PURPOSE GRADE for<br>Steel. Light and Medium Cuts<br>(up to 1/32° feed) on all<br>alloy steel forgings or shefts,<br>and on straight Carbon Steel<br>above .40°C | Blue (2019)        | None                   |
| E     | 92.0      | 217,000 | Finishing and Semi-Finishing<br>Cuts (up to 1/64° feed) on all<br>alloy steel forgings or shafts,<br>and on straight Carbon Steel,<br>above .40°C                        | Blue (2019)        | Green (2015)           |

(for iron, non-ferrous, etc.) being used on a steel job, he immediately knows that a mistake has been made in the choice of grade. Such an error could only be made because the tool room man or operator did not bother to check the grade.

The colored tools look very attractive, and it is believed that this improved appearance will help to insure better care of the tools in the tool room and out on the machines. A tool room shelf is made very attractive when many of the vari-colored tools are visible. A machine tool looks decidedly more attractive with these colored tools in various positions. Machine shops generally, have more or less of a sombte appearance, and without a doubt, the brightly colored tools add life and attractiveness to a shop, and this will be appreciated by many.



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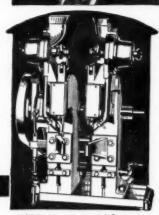


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# STEEL

A Brief Review of the Factors Entering into the Selection and Handling of the Proper Steel for the Job.

By JOHN TISSING,

Vice Pres., Chas. C. Kawin Co., Chicago.

S TEEL is an engineering material of wide and extensive application, and a substance of complex and varying composition.

The properties of plain or carbon steel depend, to a considerable extent, on the amount of carbon, and also other elements, it contains, such as silicon, manganese, phosphorus and sul-

There are, of course, many grades of carbon steels for special purposes, with more or less unusual ranges of composition; we especially refer to drills, cutting tools, chisels and certain types of springs, etc.

Special Steels

Alloy steel, in addition to containing elements already referred to, contains quantities of elements such as tungsten, molybdenum, chromium, nickel, copper, cobalt, vanadium, titanium, etc.

Steels for special applications often are very complex, containing substantial quantities of many of these elements. There are special types of steels, such as "free cutting steel?" with a considerably higher sulphur range; silicon steels carrying a silicon content comparable to that of cast iron; manganese steel containing over 10% manganese, also heat and corrosion resisting steels. These and others find special application in many fields today.

Aircraft calls for extra quality steels, used in the production of engine parts, requiring lowest possible weight per horse power, with the greatest possible degree of reliability. Such steel must be of high quality, maximum uniform-

ity, and one which responds very favorably to a high degree in the matter of heat treatment.

Steel is also classified in a general way as to its mode of manufacture, Bessemer steel is made in a Bessemer converter. Electric steel comes from the electric furnace. Open hearth, both "basic" and "acid," is made in open hearth furnaces, and in the case of Crucible steel, a Crucible is used.

The original raw material from which commercial steel is derived is iron ore. This is an oxide of iron, contaminated with many mineral impurities. The principal ore is hematite, but there are others such as limonite, magnetite, etc. Most of the iron ore used in this country comes from the Lake Superior District

#### Grade Selection

It is obvious that in selecting steel for any given purpose, the requirements to be met, and conditions under which it is to be used, must be considered carefully, as each of the elements, intended or impurities, reflects on the properties and quality of the steel, subject to modifications and improvements possible by proper and carefully controlled heat treatment.

There are today, many standard specifications issued by different organizations, such as A. S. T. M., S. A. E., etc., which are quite dependable. In many cases, though, it is best to supplement these by experience as to past performance in deciding upon any steel for any given purpose.

In addition to prescribing correct composition for any specific purpose.

one of the most important details in steel handling, for proper conformance with "actual physical" specification requirements, is that of heat treatment. This treatment, stated in general terms, is a controlled process of applying heat within closely controlled limits as to rates of heating to certain definite elevated temperature, and rates of cooling. This cooling is effected by making use of various cooling and quenching mediums, such as water which generally is most convenient.

The quenching rate of this medium, of course, drops with a rise in temperature, possibly due to the so-called vapor blanket formed, preventing effective dissipation. There are other mediums which are intended to nullify this effect and are therefore more efficient.

#### Oil Quenching

Oils used for quenching, generally have a considerably lower cooling rate than water, but produce less distortion and therefore are often used in cases of complicated shapes, especially of high alloy content. For this purpose, mineral oils of "high flash" are effective, as they are generally more stable than other oils, as well as less costly.

However, regardless of the quenching medium used, it is obvious that to a considerable degree, quenching strains are possible and must be relieved; otherwise, cracking may occur. The operation to relieve these strains is referred to as the "drawing."

It would be out of place, in an article of this kind, to delve deeply into the more technical side of these matters, such as micro-structure, etc., but upon etching a piece of highly polished steel surface, the structure becomes more apparent. This etching is done by certain mediums-acids, etc.,which effect the various elements in a differing manner, causing them to assume color or structure peculiar to themselves. Certain specific names have been given to these microscopical constituents, such as "Ferrite" which is a carbonless iron, while in the case of "iron-carbide," the term "Cementite" is used.

When these two constituents arrange themselves in a certain order, they are termed Pearlite or Sorbite, the former laminar—i. e., cementite and ferrite plates arrange themselves side by side—while the latter has more of a rosette form as its characteristic.

Like many substances, Pearlite, Ferrite etc., are decomposed by the action of heat, and new combinations formed each having properties differing materially in character, very much like the case of common water which can assume, by reason of temperature, three different forms:—i. e., "solid" (such as ice), "liquid" and "steam."

Pearlite and Ferrite remain as such up to a temperature of approximately 1500° F., depending to some extent on quantity, after which they decompose or change, forming new and entirely different constituents, such as "Martensite" which differs greatly in properties.

This Martensitic structure can be preserved by cooling suddenly, as by quenching, already referred to. Martensite is very hard and brittle, while Ferrite and Pearlite are soft and more or less tough.

#### Heat Treating

There is very close relation between the treatment and structure of steel and the physical properties. Therefore it is important to tie this in properly with temperature elevation in relation to what is usually termed "critical points," as that is fundamental in heat treatment. This elevation or degree of temperature should not be construed with the manner of working a steel in its fabrication, as also in this case, the physicals, and, to some extent, the structure are dependent on the manner of mechanical working.

Usually steel in this connection is classified under two separate heads, i. e., "hot" or "cold" working, or when cast into molds representing finished forms it is known as cast steel. Then again, the "grain size," whether this be fine or coarse, or changed, depends to a great extent on the manner in which steel is handled under elevated

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TOOLS for the TOOLROOM

temperatures, particularly with regard to critical range or ranges, at which point coarse crystals break up forming finer ones, depending on handling methods, etc.

Since all crystallization in structure is obliterated in carrying steel through the critical range, it is necessary to heat steel through this range as an initial procedure of annealing, as heating to a temperature below the critical range would cause no change in structure. Should it be carried considerably above that range, an undesirable form of crystallization may occur.

The purpose of annealing is to increase softness and ductility, and to facilitate machining operations. It also removes coarseness of grain, thereby producing a desirable combination of strength, elasticity and ductility. Further annealing relieves internal stresses. often held over from fabricating operations. It is therefore, very obvious that in all these operations intended to effect properties satisfactorily, close control as to temperature, degree of temperature, length of time steel is held at these temperatures (which also depend on size and thickness) are very important, and that ultimate strength of steel depends on many factors in addition to composition of the steel itself.

#### Grain Normalizing

Grain size has an important bearing on physical properties. Generally the finer the grain the better the physical properties. Therefore, much of the treatment of Pearlitic steel is directed to obtaining this fine grain "normalizing."

In the case of hardened steel—Martensite—the grain structure is also important. While the steel may be hardened by quenching from any temperature above the critical range, excessively high temperatures, as stated, lead to poor properties. This causes large grain size, as size of grain is largely determined by rapidity of cooling through the freezing range.

Carburizing steel is defined as the act of producing a higher carbon steel from a homogeneous lower carbon raw material. The explanation of this treatment is to place a high carbon case or surface on a low carbon steel, usually one with a carbon content of .15 to .125. The steel is packed in boxes and carburized by absorption of carbon from highly carbonaceous solid materials. Soft steels are usually cased deeply, and high carbon steels more superficially. This is controlled by heating time, temperature, or carburizing agents

Where greater stiffness of core is desired, higher carbon steel is used, but the higher the carbon in the raw stock, usually the more difficult will be the introduction of carbon below the melting range.

#### Case Hardening

Carburizing packing materials or cements vary, particularly with regard to energizing material contained therein. Usually those are used which have been found best for the purpose, or any particular class of work, mostly solids, for objects such as dies, gears, steering knuckles, bolts, etc. The work is usually carburized all over the surface, or small sections may be protected suitably by various expedients (such as copper plating) to limit the carburizing to the required areas.

In protecting and controlling the performance of steel parts, careful chemical analysis of materials is provided for and checked against specifications under which stock was purchased, and, as a further precaution, physical tests are made.

The most common of these is the tensile test, which is a measure of resistance to being pulled apart, by carefully and steadily applied load. By this same test, the elastic limit is obtained, which measures elasticity or ability of the body to regain its original shape after having been distorted. Also, the total lengthening of the specimen under test is known as elongation and usually expressed in percentage of original length. This elongation causes a corresponding decrease in cross-sectional area and is referred to as "teduction in area," also expressed in perduction in area," also expressed in per-

centage of original cross-sectional area.

Toughness is the opposite of brittleness and is measured by reduction of area. Usually a great elongation area and great reduction of area go together, so that a steel may possess both a high degree of ductility and toughness, but there may be a decided reduction of area without a corresponding elongation. Brittle materials show little elongation and reduction of area as, for instance, high carbon steel.

Brinell hardness is the number obtained, or ratio between load applied on, and the spherical area of the impression made by a steel ball forced into the surface of the steel under a 3000 kilogram (6600 lb.) load.

3000 kilogram (6600 lb.) load.

The compression test is a measure of resistance to the steel specimen being crushed. Shearing strength is the resistance to the steel being sheared or cut. Torsional strength is the resistance steel offers to being ruptured by twisting.

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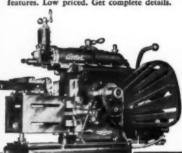
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# Cutting the Cost of Cuts

Part II—Further Examples of Contour Sawing Contrasted with Stock Removal by Other Means

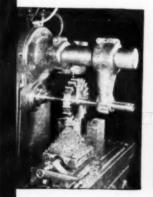
By H. J. CHAMBERLAND

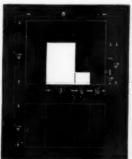
Sawing-Milling Teamwork

MILLING operations may be classed under three major groups with so-called plain cutters, formed cutters, or a gang made up of both types with possible addition of one or two in-serted teeth mills. From a quantity point of view and to obtain an outline. when the amount of stock to be removed is within reason, this is a privilege you can't take away from a milling machine. If it could be done, there would be a more limited field for heavy type universal millers. We need milling machines to generate spiral cuts, whether one or a thousand parts are involved. There are also precision spacings to be had for various purposes, so these and other reasons lead us to believe that the milling procedure is here to stay. The point is, why continue in many cases to waste material

and time when this could be avoided by getting around to it the right way? The contour sawing machine is the solution to this problem, since it can quickly remove excess material in slug-form. This procedure will materially increase the efficiency of a mill-ing machine because feed and speed can be increased as there is but little material to be removed to finish the cut. It is also true that cutters will go much longer between grinds as they are not forced to "hog." This means longer tool life and less break-and-setups. It is certainly not 1940 economy to pile up a load of chips by milling as in Figure 19, a substantial number of parts to obtain the cut shown in Figure 20. The contour saw here would be the thing even for continuous production, as the parts could be finishedmilled in multiples at a high rate of production, by making a clamping fix-

Figures 19 and 20—Why "gyp" the miller with chips when you can save time, cutters and the slug by sawing?







ture and using a two-cutter gang.

On the other hand, contour sawing in relation to small-lot production would no doubt give a milling machine idle hours unless there were sufficient fitting jobs to prevent it. When the nature of the work is within the capacity of the contour saw and quantity does not warrant the investment of expensive tooling, the contour saw is the way out, even though an extra allowance has to be made in the size of the blank to navigate a certain circle. Contour sawing can, in most cases, eliminate the fly-tool, special milling fixtures, and excessive filing to finish outlines only partly completed by sectional milling. To this we can add the practice of depreciating many a good milling cutter or cutters to obtain a



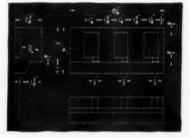
Fig. 21—The Contour Sawing machine cuts any shape inside and out, with an eighty-cent tool.

certain outline or come as close to the measurements as possible. Shown in Figure 22 is one of the jobs that helped put contour sawing in the front—almost a week's work by former methods but done in three hours by contour sawing, plus the saving of considerable material.

Some parts used for replacements, to make improvements, or for experimental purposes are very often, not only intricate, but costly to produce. Such a part is shown in Figure 23 and note that its fabrication involves three dimensions. Contour sawing easily cut out the part, left, from the solid block and layout, right. A day's work done at lunch-time speed.

#### Broaching vs. Sawing

Broaching always has been one of our most indispensable tools. It has saved thousands of dollars in the precision finishing of irregularly shaped holes. Broaching is the sole quantity production method, whereby precision



and uniformity of cut can be maintained and still hold production at its maximum rate. The broach takes on where the drill and boring tool leave off, and as effecting the average requirements it is a combination semifinish and finishing agent. Contrary to a rose reamer, plain reamer or boring tool, which remove an equal amount of metal on its gradual path through an opening, the broach produces the desired outline by step-cutting procedure, whereby and starting with the first cutting edge, the conventional hole is gradually rough-shaped until the last two or three edges produce the desired internal shape, size and finish.

In recent years the broach has superseded the reamer and precision boring equipment in numerous cases. This is due to the fact that the procedure is highly productive, when quantity permits, removing a limited amount of stock evenly distributed. The broaching machine has the advantage in this case since the ram can carry a down-

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½ H.P. motor. Long spindle construction. Grease-sealed ball bearings.
 Ideal for buffing, wire brush work and heavier grinding and sharpening jobs.
 Other Stanley Electric Grinders are available with wheels from 6" to 10".

STANLEY ELECTRIC TOOL DIVISION, The Stanley Works, New Britain, Conn.



ward stroke of 30 feet per minute, more or less depending on the nature of work.

The fact remains that until the introduction of contour sawing, it was deemed necessary to make a broach even when very few parts had to be so machined. It is not unusual when the cost of hand or jig-filing a complicated internal outline will equal that of making a broach. A broach needn't be very fancy to be placed in the formed cutter category. The broach is another tool with which the return stroke pays no dividends, in spite of the fact that the ram comes back usually twice as fast as it goes down. The broach gets a severe set-back because, like a threading tool, the cutting edges are very delicate-so tender-hearted, in fact, that it hurts them as much to come back up as when they actually cut coming down. If a broach could be so made as to act as a collapsing tap, it would relieve broaching experts of much concern.

Therefore, contour sawing is free from any of these inconveniences. The more complicated the problem, the more money saved by contour sawing. In this case, as with other comparative methods already considered, the contour saw has its limitations, but it can certainly take on enough jobs to help pay for those not within its range. couldn't bring out a more convincing example of contour sawing in this respect than the part shown in Figure The requirements here were for but a single piece, but just imagine cutting out slugs of the dimensions shown at the rate of time consumed per cut. While consideration must be given to the extra time for drilling the 9 holes, "how else and at what cost could a job like this one be done except by contour sawing?" Couldn't some similar design, involving a number of parts be similarly produced in one piece and then cut off to suit, thus making the procedure still more economical for short-run production?

Band Filing

The longest way home is said to be the sweetest, but when you consider filing, band filing is the sweetest for

the operator as well as the most economical for the one who pays off. What makes a machine tool a gilt-edge investment is when it has such flexibility, that without bending it out of shape, you can readily convert it to a different phase of production, at no extra cost. This is something one can do with contour sawing equipment. Cut, file and even polish if the drawing calls for it. Any of these operations can be performed and require about one minute change-time. It is not only a question of filing or polishing what is actually contour-cut, but the advantage of band-filing or polishing any part regardless of how it was cut.

There is no waste of material in band filing that already has been cut on the contour saw. Otherwise, it all depends on the method of cutting. One thing is sure and that is, the band file is five times faster than the jigfile and 10 or more times faster than laborious manual filing. Recent tests made with the three methods, on tool steel and using in each case a ½" wide and 16-teeth file, have produced, respectively and in one hour's time, 2 ounces of filings by hand power, 4 ounces with the jig-file and 19 ounces with the band file.

The return strokes are even more disastrous to the jig-file than they are to a hack saw. This is the reason a jig-file has a short life, and so does the hand file used by inexperienced workmen. Obviously, band files are not of similar construction to the band A band file assembly consists of a high grade steel band to which file segments are securely and quickly attached in such a way as to eliminate "bumping" action. The band is not cut and welded for internal filing, as has to be done with a band saw. It is designed to be readily unhooked and rejoined. The mechanical laws applicable to band saws apply to band files. The material and shape of cut governs the width and style of band file to use. The speed must be regulated accordingly and the pressure used determines the cutting action and finish.

Band polishing on a contour machine does, however, require a special attach-

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ment in the form of a rigid back-up support, having a graphite impregnated facing. The bands, although limited to 1" width, are similar to those used in shop band filing practice. A coarse grit abrasive band in connection with the contour saw, gives it remarkable stock - removing properties. A correctly selected fine grade abrasive will produce a mirror-like finish.

#### **Cutting Off**

If we disregard the word "contour" for the present and fit the machine with the proper saw, we have a real cutoff machine. This piece of equipment is, of course, too good for one to turn it into a continuous cut-off machine as it has more important duties to perform. Recently designed, heavy-type power hack saw machines are adapted to stack-cutting and this idea has substantially increased their productivity, and it is best we let the power hack saw attend to its business.

What I'm getting at is the competition that the abrasive cut-off wheel is giving both the band saw and hack saw procedures. From a general point of view, I would not dare attempt to make any direct comparison between the cut-off wheel and any other cutting equipment. It is a well established fact that, in relation to day-after-day cutting the cut-off wheel has an imposing lead, depending on the nature of the material and size. But the fact remains that over-all costs are rated only half those of the saw.

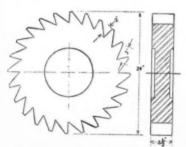


Fig. 22 — Former production time, 40 h urs—contour sawed in 3-hours.

However, we must bear in mind that this is on the basis of mixed and continuous production and not classed material and short-run production. cut-off wheel seems to attain its highest efficiency with soft materials and soft metals such as brass, bronze, aluminum and appears to retain high cutting relations to carbon tool steel. Since the problems of the average tool room and production floor involve tougher ferrous materials than ever before, I think we have something in the contour saw. For example, a 12" x 3/32" or 1/8" cut-off wheel must be supported on both sides by 4" collars, thus limiting the depth of cut to 4" with a new wheel. Every material requires a wheel of different analysis. A

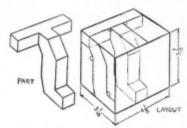


Fig. 23—A three dimension cut, that required 9-hours by former methods—contour sawed in 27 minutes.

wheel that will produce 700 cuts on carbon tool steel may produce less than 200 on high-speed steel and considerably less on several other tougher alloys. The cost of the wheel is twice that of a high grade band saw and the risk of wheel breakage is much in favor of the saw. While the cut-off wheel gives a square and clean cut, the width of cut is double that of the saw kerf. It is well to state here that the wheel has one marked advantage over the saw, which is its ability to cut hardened steels. This, however, represents but a slight percentage of cut-off requirements. If we assemble the facts and consider the low saw investment, the 1-3/8" per minute C.R.S. cutting capacity of the saw and chiefly the possibility to stack-cut, which can't



# GORTON

#### DUPLICATORS

Here is how a French motor manufacturer dcubled production of cylinder heads by using Gorton Duplicators for milling combustion chambers. (12 minutes each, floor to floor.) Shape was irregular oval with an undercut (see sketch). Material was cast aluminum alloy. This difficult shape was machined on standard

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GEORGE GORTON MACHINE CO. 1115 13TH STREET, RACINE, WISCONSIN, U.S.A. be done with the wheel, by making some simple holding device, I assume that we can produce 1000 assorted cuts more economically with the contour sawing machine than with a cut-off machine which can't do anything but that.

#### Welded Steel Construction

In concluding this resume of contour sawing procedure, it would hardly be fair not to include a brief outline of the economy resulting from the contour saw in preparing components for welding. In recent times, welded steel construction is a much discussed subject, the outcome of so many new alloys being introduced which provide added strength and reduced weight. To maintain strength and rigidity and still decrease weight has always been a basic principle of the art of welding. This now brings back the question as to which is best-sticking to castings or welding the job.

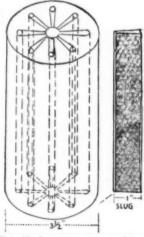


Fig. 24—Contour sawing is the only way this job can be done. The 8 slugs were cut out in 10 hours 40 minutes.

In connection with this particular subject, the torch again has the advantage for cutting heavy components going into the fabrication of bulky equipment. When it comes to making Jigs. fixtures and other items of a lighter type, there is no better and cheaper way to put the parts in trim than to saw them on the contour machine. Whether the arc or acetylene process is used, matters not in this case. We are merely interested in economy and efficiency at their maximum, preparing the components to be welded so they will bring out an attractive as well as a strong unit. The contour saw is the best bet to guarantee that the parts will have their required accuracy and quality of cut which will cause the welded job to look as though it were die cast. One of the major advantages of welded construction is the possible use of odds and ends and I don't mean scrap. The contour saw produces these odds and ends which would otherwise be reduced to chips, so one way to look at it is that material required to make many jigs, fixtures and the like wouldn't cost anything.

#### Chief Factors Governing Contour Sawing Technique

I—For maximum economy, use widest saw possible which is determined by the size of drilled hole or holes fitting the requirements of the cut. The saw may well act as a file for notching to obtain sharp corners.

2—Select α tooth construction that will provide at least two teeth contacting the work.

3—Use coarsest saw set possible for maximum chip clearance and minimum friction.

mum chip clearance and minimum friction.
4.—Generally speaking, the thinner the material the more teeth per inch required on the saw.

5—Blade tension is governed by width, the narrower the blade the less tension required, this part of it is best mastered by practice.
6—Use an even and common-sense pressure while cutting and slow up to navigate

small radii. 7—Modern metal-cutting band saws are available in 8 widths, from  $\frac{1}{h}$ " to  $\frac{1}{2}$ ". There are 3 types, namely, raker tooth, wave tooth and straight tooth.

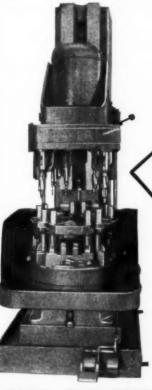
8—There are 2 thicknesses of set, light and heavy. There are 3 tempers, A, B, C, respectively meaning very hard, hard and medium hard.

9—Practice makes one an artist in any line of work and contour sawing is no exception. While the width of the saw usually determines the minimum radii possible, the operator will gradually find himself able to work from a standard high to a possible low.

10 — Before starting, check and doublecheck to ascertain you have the correct saw and speed for that particular job.

Note:—A job selector dial and speed indicator gives recommendations for requirements in connection with 46 different materials.

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# Welding Reduces Costs

Typical Examples Showing Advantages Recently Realized with Arc Welding in Fabrication

#### By FRANCIS A. WESTBROOK

THE Multi-Hydromatic Welding & Mfg. Co., Detroit, Mich., consumed only seven days' working time to advance the production of the large machine frames from the status shown in Fig. 1 to that shown in Fig. 2. If conventional construction had been used, this manufacturer reports that several weeks would have been required for pattern making alone. The frames are for large hydromatic welders, and their fabrication is accomplished with two are welding machines.

In these days when so many more charges are fixed than formerly, and cannot be cut, any manufacturing costs which can be reduced are of correspondingly greater importance. Arc welding, as an instrument of fabrica-

tion is often a very convenient and simple means of cutting costs which is far from having reached any where near its ultimate development. Welding is fast; intermediate, connecting members can be eliminated; weight is reduced to a minimum; strength is adequate; quality is improved and the equipment needed is not expensive in comparison to the savings made possible. The operation is direct and as a usual thing, numerous steps in production can be eliminated.

Here are some more recent examples of savings made by progressive manufacturers in an effort to offset rising fixed charges.

The Wallace Supplies Mfg. Co., Chicago, report that they have reduced

Figures 1 and 2—At the left is shown the prepared material, and at the right, the frames for large hydromatic welders, completed by two welders in seven working days.







Fig. 3—Bending machine constructed of cast and riveted components.

the cost nearly 50% and improved the appearance of the rack top plate of a bending machine by a welded design. The latter is shown in Fig. 4 and cost \$32.00, as compared with \$60.00 in cast construction, as shown in Fig. 3. The arc welded bender weighs only 736 lbs. and can be operated by one man, whereas the cast bender weighed 1250 lbs. and required two men for operation. Added to these advantages, the appearance was greatly improved as is evident from the illustrations. Thus the manufacturer reduced his own costs and at the same time pro-

vided an improved product for his customers, which undoubtedly helped to reduce sales resistance.

Fig. 5 shows a mining locomotive bumper which is now fabricated by the Goodman Mfg. Co., Chicago, from rolled steel plate, flame-cut, formed in a hydraulic press and are welded. This method supersedes construction of cast iron at a cost saving of some 40%.

Evidence that arc welded construction is economical in fabricating small

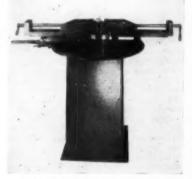


Fig. 4—Modernized design of bender with arc welded parts.

parts is provided by the work shown in Fig. 6, also made by Goodman. From left to right, these are:—a flight for a



Fig. 5 — Mining locomotive with welded bumper. Parts for this were flame - cut from rolled steel plate, hydraulically formed and arc welded.



# NEW Buffulo "RPMster" Variable Speed DRILL

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RPMster DRILL

Fig. 6 — Small parts fabricated by arc welding at a material saving in cost and weight.



conveyor, a bracket for a clutch hoist, an adapter for a locomotive bumper (in background), a brake hanger support for a mining locomotive and a slabbing machine lever. These parts, formerly made of cast construction, are now produced by are welding at a reported saving of 35% in cost and 40% in weight.

Arc welded steel reduced the cost of the 3-legged stand for the potato peeler made by: G. S. Blakslee Co., Chicago, from \$28,70 to \$12.64. The former cast iron construction is shown in Fig. 7 and the modernized form in Fig. 8. The quality of this product was also much improved as the cast iron type broke occasionally in service. Arc welded steel made the stand unbreakable and in addition, permitted production of this unit at any desired



Fig. 8—The modernized version with streamlined arc welded parts.

height without any additional charge for patterns, thus making it a simple matter to cater to customers' individual needs and assisting the Sales Dept.

The simplicity of arc welded con-



Fig. 7—Potato peeler of former design with cast components.

struction is well illustrated by the two booms for a power shovel shown in Fig. 8. The welded boom in the foreground was produced by two men—a welding operator and a fitup man. The riveted boom in the background required five men for its fabrication. The welded boom is also 400 lbs. lighter, while possessing greater strength and rigidity. The saving realized by Bay City Shovels, Inc., Bay City, Mich., the manufacturer of this item, is apparent.

Many additional examples of recent developments in arc welding applications could be cited, whereby savings and improvements in products have

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Fig. 8-Welded power shovel boom in the foreground was produced by two men while the riveted boom in the background required five men for its fabrication.

been realized. However, enough have been given to show that industrial executives will do well to look into this very simple method of cutting costs in a wide range of products. Welding will help speed the national armament program.

(Photos, courtesy Lincoln Electric Co., Cleve-

#### Master Mechanics Came—Saw and Ordered NONSLIP



#### Scientific Test Demonstrates NONSLIP'S 350% Greater Pulling Capacity

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BOICE-CRANE COMPANY TOLEDO, OHIO

# Extruding "Stainless"

New Extrusion Press Permits Extrusion of Stainless Steel, Ferrous and Non-Ferrous Tubing and Rods

HILE the extrusion of non-ferrous metals has been performed for some 35 years, it is only during the past several years that the extrusion process has been successfully employed for the production of stainless steel, nickel alloy and ferrous rods, tubing and shapes. This advance, which appears likely to open new fields for special alloys, has been made possible by the development of the hydraulic extrusion press. A press of this type, of 2000-tons capacity, built by Farrel-Birmingham Co., Inc., Ansonia, Conn., is shown.

The designers believe that with this new press, all of the currently known stainless steels and other special ferrous and non-ferrous alloys, which do not work well by rolling, welding or piercing, can be extruded without dif-

ficulty.

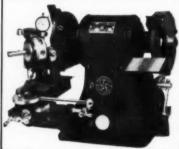
It is probably correct to say that any article extruded from a billet, acquires a grain structure more free from faults than if it had been rolled. This change in structure is due to the fact that extrusion is a squeezing-compression process, while rolling and drawing is a stretching operation. There are special alloys which cannot be rolled without developing serious inherent faults, rendering them unfit for certain commercial purposes.

Another advantage given is that extruded tubes of stainless steel, for instance, can be more easily drawn down to smaller sizes than tubes manufactured by any other process. This means that a larger reduction can be obtained from extruded tubes than from tubes made on a piercing mill. For example, it is said to be possible to draw down extruded tubes to a final dimension of a few thousandths of an inch in diameter, for hypodermic needles, the final tubes having a perfect structure.

Aluminum alloys are extruded in numerous semi-finished shapes which are readily worked into final dimen-



#### **Precision Drill Grinder**



Simple to operate—dependable—speedy—this Precision Grinder will enable you to produce perfect joints on standard twist drills in sizes from No. 41 (.096) to % (.625).

Send today for more details.

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Division Star Electric Motor Co.

Bloomfield, - - New Jersey

Clean,
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TRIAL OFFER: A handy five-ounce Combination
Brush-In-Can...ideal for shop use and for 60¢.

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16346 E. JEFFERSON RVE., DETROIT, MICH.

The billets to be extruded can be taken as rough cast billets coming from the foundry after being cut to the proper length. The skin of the billets, which is formed mostly by oxidation, remains as a thin shell in the container after extrusion, so the extruded product is formed of clean material only.

It is asserted that tubes and rods manufactured by this press are not only remarkably sound in structure but possess excellent metallurgical and physical properties and a good condition of surface. Consequently the number of draws for finishing can be con-

siderably reduced.

The amount of scrap-consisting of the thin shell of the billet and the discard -is claimed to be very low, so the difference in weight of the billets charged into the container and of the extruded product is only about 8% to 10% in the case of tubes, and about 10% to 12% when manufacturing rods. concentricity of the extruded tubes is well within commercial limits, and provided that sound billets, uniformly heated, are extruded, it is said to be within plus or minus 5% of the wall thickness. Compare with this the tolerance in wall thickness usually expected by manufacturers of steel tubing not produced by the extrusion process, which runs as high as 10% to 12%.

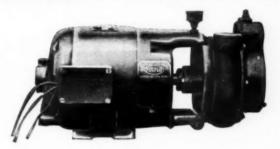
#### D. H. S. Bronze

A new leaflet describing the uses and advantages of D-H-S (Ductility, Hardness, Strength) bronze for the steel industry has just been published by the Koppers Co., Bartlett Hayward divi-

sion, Baltimore, Md.

The folder lists recommended applications and minimum physical properties of D-H-S bronze No. 1, 2, 3 and 4 and states that D-H-S bronze offers the highest combination of mechanical properties ever attained in a bronze alloy, and combines extreme fineness and density of grain structure with close binding and cleavage of all elements. Its properties are not due to analysis alone, but also to the technical and metallurgical control which is continuously maintained throughout manufacture.

#### **GUARDIANS OF THE COOLANT FLOW.**



This type of Centrifugal Coolant Pump is made in six different sizes ranging from ¼ H.P. 25 G.P.M. to 1-½ H.P. 120 G.P.M.

These units may be mounted in various positions and will operate very satisfactorily under most severe conditions.

The flow of coolant may be throttled down or completely shut off without injury to either pump or motor.

Write for complete information on the "Fulflo" Line.



THE FULFLO SPECIALTIES CO., INC.

Blanchester,

Ohio



# No. 16 TOGGLE PUNCH PRESS

The No. 16 TOGGLE with large die space is suitable for punching and shearing tie plates, punching and straightening splice bars, also for general manufacturing press, punching and shearing articles. Drive is mounted inside of frame.

The Press is equipped with magnetic or air clutch. This is a high speed heavy duty Press for many applications.

#### **GENERAL DIMENSIONS:**

|                                 | No. 16 | No. 16A | No. 16B   |
|---------------------------------|--------|---------|-----------|
| Face of slide,<br>right to left | 43*    | 53*     | 62*       |
| Face of slide,<br>front to back | 24*    | 26*     | 26*       |
| Die space,<br>slide down        | 20"    | 20"     | 20*       |
| Stroke; Standard                | 3"     | 3*      | 3*        |
| Maximum                         | 5*     | 5*      | 5*        |
| Face of table,<br>right to left | 53*    | 60*     | 66*       |
| Face of table,<br>front to back | 24*    | 26*     | 26*       |
| Capacity                        | 700T   | SSOT    | 1000T     |
| Strokes                         |        | 35      | 30        |
| Depth of throat                 | 151/4" | 151/2"  | 151/4"    |
| Weight                          | 76,000 | 82,000  | 88,000 lb |
| Motor required<br>Horse Power   |        | 30      | 40        |

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#### ALSO BUILDERS OF

Punches: Single and Double-"C" Frame Horizontal Punches Multiple Punches Gate Shears Bar Shears Angle Shears Splitting Shears Coping Machines The CoPun Shear (Cope Punch Shear) Vertical Bulldozers Spacing Tables Hydraulic Press Brake and Flanger. Hydraulic Presses.

# Broaching "41" Auto Parts

SEMI - AUTOMATIC transmissions for 1941 automobiles are bringing with them numerous innovations and improvements in manufacturing methods to turn out, at reasonable costs, the parts for these relatively more costly units.

A typical operation is shown. The part, in the foreground, is a gear out of a semi-automatic transmission. The operation required was to cut the slots shown on the front side. These slots have to be held to .003" for size and .002" for centrality with the bore.



To produce the parts to these accuracies at the "4-a-minute" rate required, a Colonial single ram broaching machine was selected and adapted, using two sets of broaches, fixtures, etc.

Instead of having broaches directly attached to the ram and pushed through the work, as usual, the broaches are

of floating construction and pulled through broach guides and work by broach pullers connected with ram in base of machine. The fixtures which locate the parts during cutting, serve as guides for the broach so that any weaving or distortion below or above the fixture during broaching, has no effect on the actual cutting itself.

The broach guides, it will be noted, incorporate a pilot for locating the part, thereby assuring accuracy of location of the machined slots in relation to the bore of the part. To provide ease of loading, the fixture table is of the receding or shuttling type, while the fixture on which the parts are loaded, is of the trunnion or "tilting" construction.

In operation, two parts are placed over studs on the fixture while in the position shown. Just before the machine ram starts down, the fixture table starts to move in toward the broach guides. As it does, the fixture tilts forward, so that, as the table finishes its forward movement, the bores of the two parts are located over the pilots in the broach guides.

At this point, the machine ram has started to move down. The broach pullers — permanently connected to the broaches—pull the tools through the guides, rough and finish cutting the slots. At the end of the down stroke, the fixture table automatically shuttles backward, out of the way, at the same time tilting the fixture backward.

Cutting speed is 30 feet per minute with a return stroke of 60 feet per minute. Production is at around 240 pieces per hour with two parts finished for each cycle. The 5 ton, 42" stroke single ram machine, fixtures, and broaches were designed and built by Colonial Broach Co., Detroit.



ulating Cushion.

#### Other Advantages of Built-In Air Cushion

- Eliminates Damaging Metal-to-Metal Impact. Noise, Shock and Vibra-
- · Prolongs Cylinder Life -Reduces Wear on Piston and Cup Leathers.
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- · Assures Smooth, Quiet. Efficient Operation at Low Cost.

What it IS What it DOES

The NOPAK Self-Regulating Cushioned Air Cylinder is one cylinder which requires no adjustment. The cushioning action at the end of each piston stroke is controlled automatically. As the piston sleeve enters the bore in the cylinder head, the air trapped between piaton and cylinder-head acts as an air-cushion over the entire piston surface.

#### "Cushion" Remains Constant

The smooth, gradual, cushioning action (predetermined by the taper, tolerances and length of cushion-sleeve, and by exhaust-bore diameter) remains constant at all times regardless of stroke length or cylinder bore. There is no needlevalve to be frequently re-adjusted, to clog up, get out of order.

For Complete Data, ask for Bulletin 77

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VALVES and CYLINDERS

DESIGNED for AIR or HYDRAULIC SERVICE

# What's New in the Industry

#### American Differential Case Broaching Machine

A UNIQUE broaching machine has been built to meet special requirements of a customer of American Broach & Machine Co., Ann Arbor, Mich.

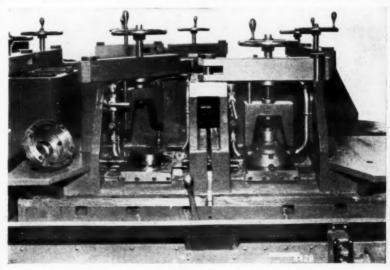
It was arranged for finish broaching the half round slots in differential cases and was used for several sizes. The machine was equipped with four cylinders for surface broaching, providing four stations, having two fixtures to each station. It involved a permanent setup with two fixture stations on each side of machine. Any of four differential case halves, making up two separate differential case assemblies, can be finished without tooling change-over.

The machine is a special 4 HC-18

horizontal unit. Fabricated machine base contains oil reservoir, coolant reservoir, coolant pump, hydraulic pumping unit, valving and motor. Inclined trough conveys chips to one corner of base for convenient removal.

Four machine slide units are provided. One on each of the four sides. All four cylinders are connected to hydraulic pump unit. Design is such that any one side of machine may be operated, and that two adjacent sides may be operated simultaneously by two different operators. Separate machine control is provided for each cylinder slide assembly.

Fixtures were designed to locate from joint counterbore or shoulder of two parts, forming one case assembly. One-



half of the assembly is completed on two fixtures on one side of machine as shown. Index for first pass is taken from one of the flange holes (lefthand station) and for the second pass from the previously broached half round (righthand station). Manually operated screw type clamp of swing out construction is provided. Fixture plates are adjustable laterally to facilitate tooling setup. Adjustment is provided in broach holders relative to fixture. Work rest pads are provided at side of each fixture.

Material, malleable iron. Stock, .010" on radius. Production, 90 pieces per hour from each side of machine.

Specifications: — Normal capacity — 4 tons, each cylinder. Cylinder diameter —5". Broaching speed—18 f.p.m. Return speed — 28 f. p. m. Cylinder stroke—18". Work height—40". Overall height—50". Net weight with tooling—10,000 pounds. Operating space—14" x 14".

#### Red Ring Gear Grinder

Developed originally for precision grinding of master gears and involute broaches in National Broach & Machine Co.,'s plant, Detroit, a new Red Ring machine is said to offer many advantages.

It is exceptionally rigid, utilizing a "U" type column, with wheel spindle mounted on long bearings. Spindle is integral with motor rotor.

The spindle slide is adjustable up and down by a hand wheel. Hydraulic counterbalance removes backlash from the lead screw. Oper-

ation of down feed against hydraulic pressure is claimed to eliminate possibility of the head sticking when small increments of down feed are desired.

The table slide is hydraulically reciprocated and automatically controlled through a feed box on front. Table speed is controlled to a high degree of precision. A cam on the table slide provides force feed lubrication to the

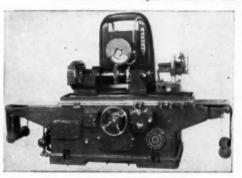
ways at each stroke. The combination V and flat ways are covered at all times by a canvas roll.

Index head is furnished with either fully automatic or semi-automatic control, as desired. Semi-automatic provides greater accuracy.

For gear tooth work, a template control trimmer is provided which trims both sides of wheel simultaneously. The table feed box includes a dead stop which brings the wheel to trimming position so that the diamond points operate exactly in line with center of wheel. The radius trimmer is mounted in tail stock. Diamond points are adjustable up and down — may be set with a micrometer.

Coolant and hydraulic pumps are external. Reservoirs are inside base.

Grinding time is greatly reduced when gears are shaved before hardening and grinding—lapped afterwards. This cycle produces better gears in less time. It is reported that in one



instance, a 12" diameter x 2" face gear, requiring a normal grinding time of 60' was handled in a combined grinding and lapping time of 20'; and shaving requires less time than the finish cutting operation which it eliminates.

#### **Decision in Patent Suit**

On June 22, 1940 a decision was rendered in the District Court of the Unit-



#### WHEN PRECISION GUARDS PRECISION

It is an old saying that "it's a poor workman who blames his tools". But shop foremen know that even the best operator cannot turn out precise and well finished work on a lathe with worn or faulty headstock gears.

To make sure of maintained accuracy at this vital spot, a well-known lathe maker has standardized on carburized Nickel-Molybdenum steels — using SAE 4815 for drive gears and SAE 4615 for the transmission gears.

These two Mclybdenum steels, in addi-

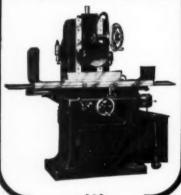
tion to having the requisite core strength and toughness, carburize to 55-60 Rockwell "C" with minimum distortion. Consequently proper initial adjustment is simple and freedom from trouble due to worn teeth is assured for an extended service period. Thus precision guards precision for years.

Rechecking your own specifications may disclose opportunities for increasing serviceability of the product by a change in materials. You will find our book, "Molybdenum in Steel", helpful. It is sent free on request.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

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# TOOL ROOM ACCURACY AT PRODUCTION SPEEDS



with

# Grand Rapids HYDRAULIC FEED Surface Grinder

Vernier wheel has .0001° graduations approximately ½ " apart which can easily be split.

This feature, plus the infinite variations of table travel obtainable by hydraulic means, makes possible the highest degree of precision grinding at production speeds.

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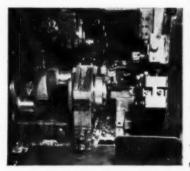
405 Straight Ave., S. W. GRAND RAPIDS, MICH.

ed States, Southern Division, Eastern District of Michigan in the case of the General Electric Co., and Carboloy Co., vs. The Willey's Carbide Tool Co.

The suit related to certain methods of production, manufacture and sale of tungsten carbide dies and tools and a decree was rendered in favor of the defendant, The Willey's Carbide Tool Co., The Industrial Diamond Co., and Fay H. Willey.

#### Turning Crankshaft Ends

Electric chucking and use of cemented carbide tools are features of this Sundstrand lathe for turning the ends of crankshafts at the plant of a leading producer of low priced cars. The lathe used is provided with three tool posts, one a vertical and two on horizontal slides at the front and back of the machine.



The operation is completely automatic. The crankshaft is merely placed on the machine and removed by the operator when machining is completed. Machining consists of boring and reaming the tranmission pilot bearing hole, boring the retainer hole, facing the crankshaft flange, and end of pilot and turning the O.D. of the flange and pilot, turn groove and chamfer.

Carboloy 907 turning and facing tools are used. Production given is approximately 25 shafts per hour per machine. Approximately 600 pieces are obtained per tool grind—one grind for every 24 hours of machine operation.



# GRINDERS

Heavy duty flexible shafting delivers an abundance of power to the working tool with a minimum of weight in the operator's hands. Place 2 to 3 times the power in operator's hands with no dead better work with less

Cut Power Costs.

Slash Time and Labor

Easily wheeled right



Close up view of angle spindle with cup wheel smoothing surface welds.

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#### WHAT YOU GET IN MALL GRINDERS

Large, husky, constant speed, aluminum frame, ball hearing motors, available in ventilated or dustproof types with 100% overload capacity.

Speed, Lightweight, Portability.

Heavy duty flexible shafting.

Two to three times more power in the operator's hands.

Built for long life, trouble-free service.



Fast and efficient production tools for all types of industrial grinding and finishing. They eliminate the need for costly compressed air and make power available in any position from the constant speed, aluminum frame, dust and vaporproof or ventilated type ball bearing motors.

The same power units can be used for SANDING, DRILLING, WIRE BRUSHING, POLISHING and GRINDING.

Write TODAY for FREE demonstration and full information.

# MALL TOOL COMPANY 7742 SOUTH CHICAGO AVENUE CHICAGO, ILLINOIS

#### Landmaco for Special Threading Operations

The machine shown was developed for special threading operations in which extremely close tolerances for concentricity had maintained between thread and body of work. Since such work is usually ground, the grinding operation being handled by supporting the work between centers, provision is made for supporting the work.

Special mechanical features include a face plate on machine spindle, supplanting the usual die head; a special carriage front on which die head is mounted,

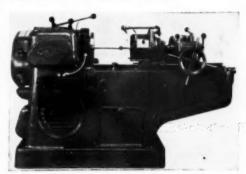
and a tail stock which is adjustable and also supports a center.

The face plate, incorporating a live center, is employed in exactly the same manner as the face plate on a grinding machine or lathe.

The special carriage supports the Lanco die head, used as a stationary type head. The head ordinarily is applied to a live spindle. Provision is made for opening and closing die head with a yoke, when necessary.

The adjustable tailstock is clamped into position on ways located on side of machine bed. These ways are of sufficient length to permit handling work ranging from 2" to 16" long.

Tailstock center is advanced to, or withdrawn from work by a quick-acting lever located on top of tailstock.



Movement of this center is actuated by a rack and pinion gear. The center can be clamped rigidly into position.

The unit is of the lead-screw type. Thus it can be seen that the thread is generated by revolving the work between centers, the die head being propelled onto the work and the thread lead being controlled by means of the leadscrew.

Manufacturers are the Landis Machine Co., Waynesboro, Pa.

#### Reeves Vari-Speed Jr.

Reeves Pulley Co., Columbus, Ind., announces a Vari-Speed Jr. bringing the many advantages of variable speed control to small, light machinery.

By means of this low-cost unit.

#### AND WORKMANSHIP QUALITY IN PLUNKET VISES



The Shaper Vise has graduated base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

rices are net, f. o. b. Chicago. Write for illustrated folder today. Dealers wanted in unoccupied territory.

QUARE BASE SHAPER VISE

J. E. Plunket Machine Co. 1823 W. Lake Street

**THE CONWAY DISC CLUTCH** embodies the very latest practical developments, in design and construction.



Easy Engagement
Instant Release
Dragfree Idling
Overload Capacity
Sturdy Pattern
and
Interchangeable
Parts are some of

the CONWAY features that solicit a trial on your machine to prove its claims to be — THE LAST WORD IN FRICTION CLUTCHES.

Have you Conway bulletins P-24, L-28 and XYZ-L on Disc Clutches, S-10 on Overload Release and Slip Clutches, No. 36A on Compression Clutches, K-32 on One-Revolution Clutches, E-8 on Expansion Clutches?

Patented in U.S. A. and Canada

#### THE CONWAY CLUTCH COMPANY

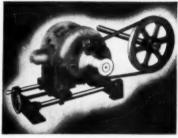
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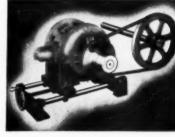
Cincinnati, Ohio

standard constant speed motors are easily and inexpensively converted into variable speed units. No special shaft extension is required.

The standard unit comprises a disc assembly and adjustable motor base. The disc assembly consists of two coneshaped discs (one stationary and one laterally adjustable); a self-adjusting tension spring, a spring adjusting nut and cover. This assembly is applied directly to the standard shaft extension of the motor and the motor is mounted on an adjustable base. The V-belt. driving between the two discs, and the sheave pulley on the driven shaft, is a standard Section "A" or "B" belt.

By means of an adjusting handwheel. motor is moved forward and back.



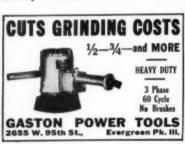


When nearest the driven sheave, the V-belt runs over the largest diameter on the discs and maximum speed is obtained. Reversing the handwheel moves the motor away from the driven sheave, the V-belt runs over smaller diameter on the discs (the adjustable disc moving out to accommodate the belt), and speed is reduced. When the motor is farthest from the driven sheave, minimum speed is attained.

Speed variation is "infinite" within the limits of the unit-i. e., a countless number of operating speeds are available without "steps" - accomplished while machine is running.

The unit is built in six different sizes of disc assembly, for use with motors of from 1/8 to 11/2 h. p. providing speed control over a range of from 13/4:1 to 23/4:1, inclusive, depending upon the size, h.p. and speed of unit selected. Two sizes of motor bases are available.

The unit is also available in a countershaft type for requirements of either unusual speed reduction or speed increase.

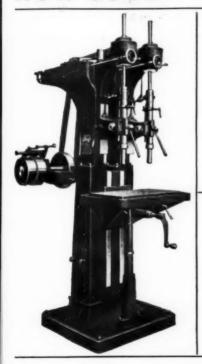




# THE VALUE OF A TOOL Depends on WHAT IT WILL PRODUCE

The Cost of Finished Work is the real consideration

#### HOW GOOD - - - HOW FAST



If you are interested in Good Drilling Good Tapping

Ask AVEY

Si se interesa Ud. en buenos trabajos de barrenar y roscar, consulte a AVEY.

We have
Tapping Attachments
as well as
Built in Tappers
All Are Quality Tools

Tenemos aditamentos de roscar, así como Roscadoras de Construcción Integral.

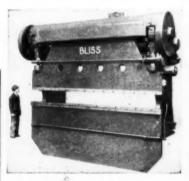
THE AVEY DRILLING MACHINE CO.

#### Bliss Presents New Press Brake

E. W. Bliss Co., 53rd St., and 2nd Ave., Brooklyn, N. Y., introduces an addition to their line of all-steel press brakes. It is equipped to handle a wide range of different types of work, with a capacity of ¼" x 12" mild steel. Deflection in bed and slide is held to a minimum by the use of generously

proportioned beam members, giving rigid contruction, yet retaining a smooth pleasing appearance.

An electrically operated friction clutch, designed especially for "Bliss" press brakes is employed.

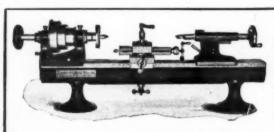


Bronze bushings are provided for eccentric shaft and intermediate shaft bearings and a V-belt motor drive is used. Intermediate gearing is lubricated by oil or grease contained in oil-tight housings while guards for the larger gears retain the lubricant.

Specifications: — Distance between housings, 12° 6"; depth of gap 12"; stroke of slide 3°; adjustment of slide by motor 6"; distance bed to slide with stroke down, adjustment up 12"; the machine operates at 30 strokes per minute.



70 Willard Ave.,



PROVIDENCE, R. L.

#### WADE Bench Lathes

Economical, accurate, enduring for turning, drilling, threading, grinding, milling and screw machine operations.

Wade Tool Co. Waltham, Mass.



#### READ THIS GUARANTEE!!

We guarantee that the Combination Drill Table and Vise will save its cost in six months' time on labor alone. If, after 30 days' trial on your Drill Press you are not convinced of this, you may return the Combination to us at our expense. There are no strings attached to this guarantee in any way. We put the Combination in your shop, let you try it, and after 30 days' time a decision is entirely up to you as to whether you wish to keep it or not. If you decide to return it you may ship it back, transportation charges collect.

Let us know which size you wish, and we will ship a Combination to you at our expense for a FREE 30 DAY TRIAL.

Write today to

MODERN MACHINE TOOL CO., MICHIGAN



tory grinders permit produc-tion savings up to 80%, with added accuracy, perfectly finished parts, rapid production and the ability to make quick job changes. Can be used on form tools including Tungsten Carbide.

Model A

Send for bulletins giving full details.

PETERS TOOL CO., INC.

#### LET US QUOTE



Our new modern plant is fully equipped with special machinery for

COMMERCIAL JIG BORING, DESIGNING AND BUILDING of

DIES, JIGS AND FIXTURES LARGE OR SMALL

We can handle your Jig Boring jobs at reasonable prices on our new 18\*x36\* Pratt & Whitney Jig Borer. Quick service.

Have been delivering satisfaction since 1929-let us serve you.

QUALITY TOOL & DIE CO.

Ray W. Rice, Manager,

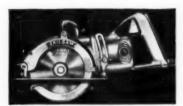
ID1 N. Noble St..

Indianapolis, Ind.

#### A New 6" Skilsaw

An improved 6" Skilsaw has been added by Skilsaw, Inc., 4747 Winnemac Ave., Chicago.

Known as model "67", it is a powerful 6" saw for heavy duty service. It is more compact and is ideal for use



by the carpenter - builder on small homes, garages and for general remodeling work as well as for all intermittent maintenance sawing, except flooring work. May also be used with abrasive discs for scoring tile, concrete, etc. It cuts to a and for tuck-pointing. and for tuck-pointing. It cuts to a depth of 7-7%". Will rip and cross-cut hard wood up to 1"; cross-cut dressed pine lumber up to 2"; bevel cut lumber 1-3/16" thick at 45°. The blade has a free speed of 3400 r.p.m. and is protected by an automatic telescopic guard that rotates on ball bearings. The base is easily adjusted for depth and bevel cutting. Every moving shaft is mounted on high quality ball bearings for quiet operation and long life. It is 151/2" long and weighs only 11 lbs.



No. 1 cuts up to No. 11 gauge strip or sheet. No. 2 cuts up to 1/4" steel plate.

Special Blades for shearing stainless steel.

BREMIL MFG. CO.

1720 Pittsburgh Ave.,

Erie, Pa.



Timken roller bearing mounted and bored for No. 4 Morse taper, with range of 4 geared power feeds.

Standard equipment includes magnetic and drum control switches, with three-button starter station having forward, reverse and stop buttons. All tapping operations are done electrically by means of instantaneous control of the motor direction. Movement of arm on column is controlled by a two-way drum switch, with motor and gearing mounted on top of column.

For more information, write us.

CANEDY-OTTO MANUFACTURING CO.

#### The Anglemaster Sine Vise

Marburg Brothers, Inc., 90 West St., New York, N. Y., offer a new sine vise that should appeal to skilled toolmakers. Manufactured from suitable steel, heat treated and seasoned before finishing, the vise embodies the features of a rugged useful tool and a precision gage.



Quickly and accurately it handles angle grinding, inspection, or layout. It is ground and lapped to be perfectly level, parallel, and square, thus being adaptable to a wide variety of useful applications throughout the tool room and shop.

New Features include: 1. Precision sine rolls, exactly 5" apart, which permit quick, accurate angle setting. In grinding, ordinary magnetic chucks will hold the Anglemaster at any angle by means of a size block or planer gage—without strapping or clamping devices.

The non-projecting telescoping screw, provides pressure to the slide jaw where it is most efficient and effective

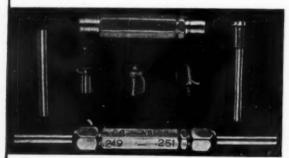
 The removable knurled screw knob, held in place by an internal spring and easily detached after work is correctly set, thus insuring against accidental change in setup.

4. The slide jaw, lapped to a precise fit, which will not raise with the work. With a piece gripped firmly between the jaws at one end, actual measurement is claimed to show less than .001" variation between the jaws at the opposite end.

5. An accurate integral V-block, provided by a V-slot in the exact center of the fixed jaw.

Length overall is 6". Length between

### Look! Get Double Your Money's Worth



Precision lapped to the brilliance of a diamond.

Tolerance for sizes .030" to .500" is 00005"

Tolerance for sizes .500" to 1,000" is 00008"

Gauging members can be turned on opposite ends when worn, giving plug 100% more life. Note the new aluminum handle and new brass collet construction.

All U. P. P. products guaranteed-25,000 gauges carried in stock-Shipment usually made the same day.

UNITED PRECISION PRODUCTS CO. 4618 W. HURON STREET CHICAGO, ILLINOIS



The Manufacturers of America's Finest and Most Complete Line of Power Driven Machinery.

DURO METAL PRODUCTS CO. DEPT. BB8, - 2655 N. KILDARE AVE., CHICAGO, ILL.

#### BURKE

#### MILLING MACHINES

Make Fast Work of Small Jobs

Motor Driven

Timken roller or ball bearings to spindle

Write today for circulars.



#### Burke Machine Tool Co. 297 E. 16th St., Conneaut, Ohio

Constitution of the Cold for th

sine rolls is 5". Width is  $2\frac{1}{2}$ ". Height is 2". Depth of jaws, 1". Travel of slide jaw, 3". Net weight,  $5\frac{1}{4}$  lbs. Shipping weight,  $6\frac{1}{4}$  lbs.

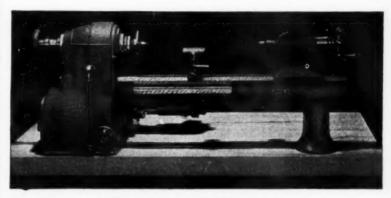
#### 612 Pounds of Chips Per Hour

A recent job at General Electric Co., showed chip removal at the rate of 612 lbs., per hour using two single point Carboloy tipped turning tools. It involved turning a steel casting for a rotor spider hub. It is reported that



the cost was recently cut to  $\frac{1}{2}$  cent per lb., of chips, including tools and labor, through the use of carbide tooling. Depth of cut was  $\frac{3}{4}$ " with a  $\frac{1}{16}$ " feed per revolution. Due to the angle of the tool, chips were approximately 1" wide.

An interesting side light on this job was that the use of high speed steel for machining had previously necessitated stopping every 3 or 4 revolutions, due to breakage caused by blow holes and sand, while with the carbide tools, the cut could be taken the entire length of the riser before regrinding, a distance of 37".



#### DON'T BUY UNTIL YOU HAVE SEEN THE

### NEW--"Stark",

Integral Drive Precision Bench Lathe

#### ITS BUILT-IN DRIVE LEADS ALL COMPETITORS

The first tool of its class with builtin motor and speed changing mechanism, entirely eliminating mill wrighting.

Nothing under the bench . . . nothing overhead. Special bench or even bolting to bench, unnecessary.

The ½ h. p. geared ball bearing motor drives through a disc clutch and vertical V belt sheaves, and through V belts to the headstock, giving any speed at the turn of a wheel (located in front of lathe) from 156 to 2200 r.p.m. in Standard Model, and 260 to 3500 r.p.m. in High Speed Model. Speeds registered on a neat indicator.

Simply moving control lever to right engages the clutch, vertical position

releases, moving to the left instantly brakes the moving spindle.

Time-tried Stark double taper bearings in Standard Model. Best precision preloaded anti-friction bearings in High Speed Model.

Both ¾ and 1 inch collet capacity furnished in either model . . . 9 inch swing . . . 40 inch length of bed . . . Weighs 310 pounds . . . Takes regular Stark Attachments, Collets and Chucks.

Stark accuracy and stamina are traditional . . . incorporated in this streamlined new lathe.

Priced at only slightly more than other precision lathes with SEPA-RATE complicated drives.

STARK TOOL CO. WALTHAM, MASS, U.S.A.

ESTABLISHED 1862 . ORIGINATORS OF THE AMERICAN BENCH LATHE

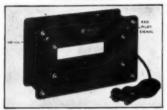




Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO. 102-105 Lalayette St., New York, N. Y.

## AMC DEMAGNETIZER A TOOL ROOM NECESSITY



Every tool room needs this simple, portable, sturdy demagnetizer. Small parts passed through the powerful AMC field are instantly demagnetized. Large, flat surfaces can be demagnetized by sliding the device over the surface.

Price is only \$32.50, complete as shown.

Write for full information.

ALOFS MFG. CO., Grand Rapids, Mich.

#### Rogers Cabinet Base Knife Grinder

A new Type B-26-60 cabinet base knife grinder has been developed by Samuel C. Rogers & Co., 191 Dutton Ave., Buffalo, N. Y.



An outstanding feature is the long cabinet type of base which extends the entire length of the heavy, box type bed, eliminating the need for extra end standards. Designed for "edge up" grinding, it may also be adjusted for grinding "edge down" if desired.

Transmission is of the straight and cross belt and shifting lever type, designed for maximum smoothness of traverse and shifting, for accurately ground cutting edges.

5000 SIZES Files SHAPES AND SWISS FILES

#### Ask for Catalog WF.

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss Files. Ask also for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

GROBET FILE CORP. OF AMERICA 3 Park Pl., New York, N. Y.

# MOTORIZE Machine TOOLS

## for High Speed... Economical Production

The Turner Uni-Drive—the motorizing unit with FOUR-SPEED Selective Sliding Gear Transmission—is especially designed for installing on LATHES—SHAPERS—MILLING MACHINES—RADIAL DRILLS—BORING MILLS—HOBBING MACHINES. And the new Brown & Sharpe Drive for AUTOMATIC SCREW MACHINES which gives unlimited range and flexibility.

Write for prices and literature or see your nearest dealer. Dealers write—

THE TURNER MACHINERY CO. 1638 CENTRAL ST., KANS. CITY, MO.

The TURNER UNI-DRIVE

#### Reamer and Cutter Grinder

Repeat orders from prominent manufacturers are convincing testimonials.



#### A machine in a class by itself

With this Universal Tool you can do any tool grinding job within its range, including Carbide tools, at a big saving in time.

Ask for bulletin No. TG409H

K. O. LEE & SON CO.

Aberdeen, So. Dak.

"practical tools for practical men"

KNOCK-OUT

The machine is adjustable for grinding flat or concave bevels. It is equipped with full automatic cross feed—10° cup grinding wheel, self contained, wet grinding attachment, and is adjustable for various lengths of knives up to the capacity of the machine.

Motor driven units are equipped with ½ h.p., ball bearing motors. Belt driven machines have 8" diameter tight and loose pulleys and should run at 1200 r.p.m. Table speed is at the rate of about 30 feet per minute with a grinding speed of approximately 3600 s.f.p.m.

Five models are offered to handle maximum knife lengths from 26" to 60".

#### Trico Loose Pulley Oiler

A new, visible, u n b r e a k a ble loose pulley oiler for slow and high speed a p p l i c a tions, without flooding, is a n nounced by the Trico Fuse Mfg. Co., 2949 N. 5th St., Milwaukee, Wis.



The oiler illustrated is intended to re-

place common grease or oil cups supplying visible, automatic, fool - proof lubrication, prolonging the life of

GROBET
ROTARY FILES
ground from the solid

#### Ask for Catalog WG

the most complete catalog of its kind, illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also diesinkers' burs.

GROBET FILE CORP. OF AMERICA 3 Park Pl., New York, N.Y.

# KRW HYDRAULIC ARBOR PRESSES HAVE SPEED AND POWER FOR INDUSTRIAL USE



Rack teeth cut directly into



Heavily constructed enclosed druss and ratchet raises and lowers hod.



Extensible cross-arms for greater leverage have locating grooves for extended and central notitions.



训

Oil reservoir tank has convenient filling plug and shut-



V blocks furnished have ma chined shoulders for accurate alignment on hed



Machined shoulders align V blacks when in inverted position and prevent climans

Built with the speed and strength necessary for industrial use, KRW Presses perform such operations as broaching, assembling, straightening, bending, offsetting, squeezing, pressing, and flattening. Small blanking operations can be performed when the blanking dies are built into a die set provided with guide pins.

Strictly a one-man press, special KRW features minimize operator fatigue. Trussed design of bed and crown members results in extreme rigidity and accuracy.

Write for new bulletin describing this cost-cutting equipment.

#### PRICES F. O. B. FACTORY, ARCADE, N. Y.

PRICES SLIGHTLY HIGHER WEST OF ROCKIES

 No. 37—25 ton Hydraulic and Sensitive Arbor Press
 \$180.00

 No. 37E—50 ton Hydraulic and Sensitive Arbor Press
 235.00

 No. 37E—75 ton Hydraulic and Sensitive Arbor Press
 365.00

#### K. R. WILSON

27 Lock Street, Buffalo,

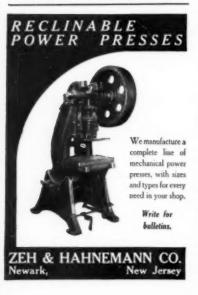
N. Y., U.S.A.

Export Department 90 West St., New York, N. Y. West Coast Branch 722 Mateo St., Los Angeles



We've been making them for our own machines for 25 years. Exclusive design ... without tie-rods. More compact Heads removable without disascending entire unit. All cylinders cast iron, machined and honed. All diameters, lengths and mountings. Hand valves; foot pedal valves; electric operated valves and our own exclusive design automatic self-operating valves. May we quote you on your requirements?

The Bell Machine Co. 61 Jackson Dr. Oshkosh, Wis.



bearings and eliminating costly shutdowns and repairs.

Three distinct principles of operation are employed:—thermal, capillary and gravity action. The copper tube transmits the heat of the pulley hub to the oil reservoir to produce quick thermal action; the wire re-inforced wick feeds oil by capillary action, and it is dropped on the bearing by gravity.

Available in one and two ounce capacities with 1/8" or 1/4" pipe thread fit-

tings.

#### U. S. Electrical Motors Builds Eastern Plant

Reversing the expansion procedure of eastern manufacturers who build branch plants on the Pacific coast, a west coast electric motor manufacturer is building a new plant on the Atlantic coast. Construction has begun on a complete production plant at Milford, Conn., by U. S. Electrical Motors, Inc., a California concern.

The site is on the main of the New York, New Haven and Hartford Railroad, 63 miles out of New York City. The plant will be completed in November and will be equipped with new machinery for the production of electrical motors, including horizontal, vertical, Varidrive and Syncrogear types, and aircraft testing auxiliary motors.

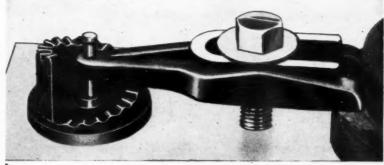
The firm's west coast plant is located in Los Angeles and heretofore shipments to the Atlantic coast have been made from California, with assembly operations carried on in Brooklyn. The firm also maintains a Chicago assembly plant.



Write for Catalog.

NUMBERALL STAMP & TOOL CO., Inc.
Huguenot Park. - Staten Island, N. Y.

#### **K-O Adjustable U-Clamps**



K-O Adjustable U-Clamps are made in 3 styles and six sizes. Cut shows our No. 4 for ½ or 5/8 in. bolt. Price \$1.25 each.

Send for circular showing all sizes, specifications and prices.

K-O PRODUCTS CO.
BENTON HARBOR, MICHIGAN

## The REN Model DYER SPOT WELDER

Built with the usual surplus of everything to maintain their high reputation for:

Strength

Sturdiness

Capability

Extra heavy transformer, horns, secondary, and steel cabinet construction.

Adjustable lower arm

Ouick - Positive

Foot, Air and Motor operated units in 5 to 50 KW Ratings.

Send for Details-Today



2727 Walnut St., Kansas City, Mo.



#### Seybold Precision Knife Grinder

A newly designed 100" precision knife grinder is offered by the Seybold Division, Harris-Seybold-Potter
Co., Dayton, O. It is a high speed machine with automatic grinding wheel feed and centrifugal pump cooling system. Removing a minimum of metal, it quickly produces a keen, true cutting edge that requires little honing.

It does not require an experienced operator, a n d grinds equally well, shear blades or beveled knives such as planer, chipper, hog, barker, veneer, paper, rag, granulating, tobacco, a n d

scraper or doctor blades—in fact, almost all straight knives in general use.

A unique feature is a hollow threesided knife bar, each surface presenting a different series of angles to the ac-



tion of the traveling grinding wheel. A fourth open side makes it easy to boit or clamp various types of blades to the bar.

On the surface of the knife bar, where most of the grinding of paper cutting knives is done, the stud-nut principle for fastening the clamps has been retained. This gives a definite position for the clamps and permits uniform spacing.

In designing the new machine, special consideration was given to shear blade grinding. A variety of sizes can be accommodated and up to 6" widths can be ground satisfactorily. The adjacent surfaces of the knife bar are made to accommodate almost all straight edge knives that are in general use.

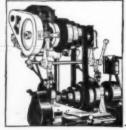


#### THE HANDIEST RACK YOU EVER SAW

Greatest capacity — Smallest floor space 4 arms, 51\* high, stacks 10,000 lbs. flat or round stock. 3 stands for 20! lengths; 2 for 12! or shorter. Use against wall or back to back in center of room. Cost is small, value big.

Write for circular and prices.

Wm. S. Yohe Supply Co. 503 Mahoning Rd. N. E., Canton, O.



#### **End Tool Shortage Worries**

Modernize your present cone pulley machine tools. Equip them with Remco Drives. Apply power direct, to end production "bottle-necks"—speed-up output. Remco adjustable motor rails take any motor—new or USED—of reasonable size. Saving on belting alone very often pays for a complete Remco installation. Write! Remco Products Corp., State St., at R. R., York, Pa.

#### **REMCO MOTOR DRIVES**

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.



#### SPEED IS THE WATCHWORD

#### **ACME JIG BUSHINGS** Speed up your tooling-

By releasing your men for more important work By being there when you need them

A.S.A. and Acme Standard bushings from stock. Special bushings made up on short notice.

Write for Catalog



#### ACME INDUSTRIAL

210 N. Laflin St. Chicago, III.

MONroe 4122



#### PRICE

Arbor Presses range in price from \$9 00. Foot Presses from \$24.00.

#### OUALITY

FAMCO gives you the most for your money! All presses are scientifically designed, and accurately machined of selected materials to assure long and dependable service.

#### VARIETY

Choose from 40 stock sizes and models (floor and bench types). the press best suited for your requirements.

#### DELIVERY

Most orders filled from stock within 24 hours.

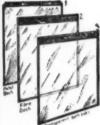
Write for literature.



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Any size or style to order, stiff or flexible, to suit your requirements.

Send for folder and quotation.

WADE INSTRUMENT CO.

recision follet Chuck BECAUSE OF its unique D design, the Erickson Precision Chuck collet grips equally firm from front to back. No loosening even when holding on flutes. Open-slotted at BOTH ENDS, the Erickson collet can accurately collapse its 8 gripping surfaces by 1/32. Therefore grips correctly even on flutes or slight shank tapers. Sizes 1/2" dia. to No. 80 Drill. Chuck Shank can be made to fit any type spindle, Male or Female.

ERICKSON STEEL CO.
East 80th & Bessemer.

Ohio

Cleveland.

All gears and the clutch operate in an oil bath. Adjustments and controls have been simplified.

The Grinder is made in three standard sizes—70", 100" and 128" lengths—other sizes to order.

#### C-F Welding Positioner

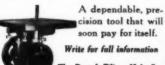
Recently added to the C-F line of welding stands is the new size, Model 12 Positioner, capacity 1,200 pounds. Like other units of this line, Model 12 can be tilted a total of 135° from horizontal and table can be revolved through a full circle (360°) regardless of angle of tilt. Table is removable for attachment of special jigs or fixtures and is adjustable in height. By mounting the operating mechanism on a special base, extremely large and bulky work can be fully rotated when tilted either vertical or a total of 135° without any interference from floor or pedestal mounting.

The unit can be furnished fully powered wth independent motor and controls for table tilt and table rotation. Power for table rotation can be furnished with either constant or variable speed drive. It can also be furnished for manual operation with independent hand wheel for table tilt and table rotation, or a combination of manual and power operation.

Other advantages claimed for these 1 set-up universal units are: self-locking in any set position—safer, more convenient.

Manufacturers are the Cullen-Friestedt Co., Chicago, Ill.

### \$25 BUYS A POSTEL (f. o. b. ) DIE FILER



The Postel Filing Mch. Co., 915 Washington Ave., So., Minneapolis, Minn.

#### **ERRINGTON MECHANICAL LABORATORY**

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Style D-E. Quick Change Tools

# MARSCHKE Heavy Duty Grinders and Buffers



A catalog showing seventy different grinder and buffer specifications will be sent promptly upon receipt of request. Considering only such major specifications as weight and sizes of motor, wheels, bearings, spindle diameters, you'll find a lot of other machines to compare with MARSCHKE ELECTRIC GRINDERS and BUFFERS.

But do not overlook the less spectacular and more important items of material specifications, workmanship and particularly the provisions for lubrication, bearing and motor protection, and above all the details of wheel guard construction.

Let us tell you about the details accounting tor the superiority of MARSCHKE GRINDERS and BUFFERS.

Vonnegut Moulder Corp. 1805 Madison Ave., Indianapolis, Ind.

### GUARANTEED

FOR 5 YEARS

When you purchase a STEEGE Drive for your lathe, shaper, miller, etc., you're



protected by our broad 5-year guarantee.

STEEGE Drives are easily installed prices \$35.00 up—sent on 30 days' approval. Let us send catalog.

#### W. L. STEEGE MACHINERY CO. (Our 23rd Year)

548 W. Monroe St., Chicago, III.



#### A. C. Flex-Arc Welder

A new all - purpose portable a.c. welder designed for all-around general utility service and production welding of every type, is announced by the Westinghouse Electric & Mfg. Co., Dept. 7-N-20, East Pittsburgh, Pa. Standard models operate on either 220 or 440 volts, are completely self-contained, and incorporate several distinct new design features.

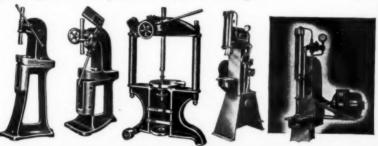


From 20 to 250 amperes of welding current is available in 27 current steps, with increments properly proportioned to meet the needs of welding with a wide variety of electrode types and diameters. Current adjustment is easy; just select the current desired, insert the bayonet plugs in the proper receptacles and the machine is ready to weld. Current values are clearly indicated in large legible numerals.

Safety is well provided for. A builtin "De-Ion" breaker insures protection against long sustained overloads, such as might occur by accidentally leaving the machine short circuited. This is convenient. too, for disconnecting the machine from the line without having to go back to a service or feeder switch. Open circuit or striking voltage is exceptionally low, being on the

#### BROACH and ASSEMBLE

standard styles and sizes—manually operated presses from 1/4 to 35 tons pressure—motor driven hydraulic presses from  $1\frac{1}{2}$  to 15 tons pressure. Write for catalog F.



#### GREENERD ARBOR

Est. 1883

NEW HAMPSHIRE

### MICROMETER ACCUR



x 101 Capacity

Micrometer stop on platen gives direct reading to .0001°. Feed dial reads to .0005° on diameter of work. Maximum collet capacity ½°.

Crystal Lake-the grinder with the Micrometer Stop on the Platenassures accurate grinding to size regardless of pressure on the wheel. Can be used for internal and spline grinding on dies, gauges, etc., for grinding circular tools, cutters and reamers, for hexagonal, square, cam and punch grinding and many other jobs where positive control of accuracy is necessary. Available in plain or universal (illustrated) models.

Write or Wire for full information.

CRYSTAL LAKE MACHINE WORKS CRYSTAL LAKE,

order of 80 volts at 20 amperes, and ranging down to 50 volts at the highest current rating.

The welder is completely self-contained and portable, being enclosed in a rugged steel case, mounted on three wheels. High efficiency, high power factor, and low no load losses assure maximum operating economies. The welder is furnished complete with all accessories, including welding helmet with lens, electrode holder, all leads, and a 17 pound assortment of electrodes. A three-pronged plug and receptacle for the power lead is included.

#### Stepping-Up Cutting Speeds

A bulletin issued by General Tool & Die Corp., 62 Franklin St., East Orange, N. J., thus analyzes an interesting example of the savings resulting from a 100% increase in cutting speed:

A—The machine tool operator earns \$1.00 per hour, or \$8.00 per eight hour day.

B - Rexalloy tools are claimed to

#### DYKEM STEEL BLUE

STOPS LOSSES

making dies & templates



Simply brush on; ready for the layout in a few minutes. The dark blue background makes the layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy. Write for full information.

#### THE DYKEM COMPANY

2301 G North 11th ST., ST LOUIS, MO.

(In Canada: 3194 Dundas St. West, Toronia, Ont.)

operate at 100% increase in speed over H. S. S. tools.

C—Percent of cutting time contrasted with total time will average 70%. Percentage of down time to total time will be 30%.

The question is the amount of money saved per day and per hour, and the percent increase in production under conditions A, B and C.

Total time per day in minutes figures eight hours x 60 minutes per hour or 480 minutes.

Total down time per day equals 480 minutes x 30% or 144 minutes.

Total cutting time per day equals 480 minutes x 70% or 336 minutes.

A 100% increase in speed affects the cutting time only. The operator would be expending 336 minutes' cutting time with H. S. S., or should be able to machine the same amount of work in half this time (168 minutes) with Rexallov.

If the same amount of work were done in 312 minutes with Rexalloy tools as performed in 480 minutes with H. S. S., there is a substantial increase in production, determined by subtracting 312 from 480 minutes which gives 168 minutes and dividing this by 312 which gives 54%.

The saving per day is calculated by multiplying \$8.00 by 54 or \$4.32. Dividing \$4.32 by eight gives 54c as the saving per hour, which would soon pay for the improved tools.

#### J. & L. Turret Lathe Tools

Three new sheets have been issued for the "Tools For Turret Lathes," catalogue of Jones & Lamson Machine Co., Springfield, Vt.

These sheets replace pages, numbered in Roman figures; 2 and 3; 6 and 7; and, 8 and 9; which should be removed from the catalogue and destroyed.

A gummed photographic sheet shows how to insert the new leaves.

They are preparing, for this catalogue, many new sheets which will be issued in the near future. It is the intention, to cover the whole line of J. & L. Standard Turret Lathe Tools eventually, and to use this book as a medium to inform users of the production of new or improved tools.

# The SEAL of GOVERNMENT APPROVAL

ROSS VALVES were

selected by the U. S. Navy, for the control of elevator operation on airplane carriers . . . They are used at Fort Knox, to operate the immense door which guards the billions of gold stored there in underground vaults.

Both the Government of the United States, and the Industry of the United States have placed the seal of approval on Ross Air Control Valves.

Bring your air control problems to Ross.





ROSS Operating VALVE CO.

DETROIT, MICHIGAN



#### TRICO OILERS

SAVE TIME-OIL-WORRY



No guesswork—bearing failures waste—idir machine time—oiloaked motor windings—fire and accident hazarde, when you use TRICO OILERS. There's a type for every application.

WRITE FOR BULLETINS.

TRICO FUSE MFG. CO. Milwaukee Wisconsin

### ABRASIVE WHEEL DRESSERS



KEEP GRINDING WHEELS SHARP AT LOW COST. SPECIAL DRESSER FOR SURFACE GRINDER GIVES HEAVIER CUT WITHOUT BURNING.

SEND FOR CIRCULAR

M & S DRESSER 377 CORNWALL ST., HARTFORD, CONN. **Manufacturing Kennametal** 

A new 6-page folder describing how Kennametal is manufactured, where it can be used and its advantages as tool material for machining steel of all hardnesses up to 550 Brinell, has just been issued by McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa.



Entitled "Cut Steel Profitably with Kennametal Tools and Blanks," the new folder contains complete factual data on this new hard carbide tool material, yet can be easily read in 15 minutes. Three tables describe (1) the comparative physical properties of Kennametal, (2) materials machined with Kennametal and (3) recommended speeds for machining steels of various hardnesses. A chart on Page (4) demonstrates the increased cutting speeds and greater hardness range of steels machined with Kennametal, as compared to cobalt chrome alloys and high speed steel. Illustrations show typical turning, milling and shaping operations employing Kennametal-tipped tools.

# for SENECA FALLS Automatic lather WORK DRIVER

Self Centering ... Quick Acting ... No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Fails St., Seneca Falls, N. Y.

#### A CLAMP for Every Purpose



Forged Steel Quick Acting Deep Reach Welders



A.

Sizes Available: 3/4" to 10' opening 1/2" to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co., 1945 WAVERLY AVE., CINCINNATI, OHIO

# CHECK THESE VITAL POINTS BEFORE BUYING

1-Size and shape of bearing block

2-Overhang or distance from shank to boring bars
3-Simple or complicated design

4-Accuracy or readability of dial screw

5—Range of boring jobs
6—Are boring bars, wrenches, etc. included?
7—Is the price reasonable?

#### CRALEY OFF-SET BORING HEADS

meet all your requirements. Made in 7 sizes for everything from the smallest holes up to 20st diameter.

Write for full information.

C. C. CRALEY MFG. CO. SHILLINGTON, PENNSYLVANIA



#### ECONOMICAL BENCH FURNACE

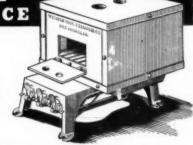
### NO BLOWERS OR AIR PRESSURE REQUIRED

Fast, Even, Indirect Heat

A compact solidly built and efficient hardening and tempering furnace. Cast iron body with light weight, high refractory lining. Pyrometer opening in rear wall. These burners equipped with pilot lights. Rue in furnace temperature approximately 100 degrees per minute.

Depth Size of Opening Shipping Weight
7° 2%'x5° 85 lbs.
Specify whether mixed or natural gas is used.

Price, \$55.



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DIES AND METAL STAMPINGS
WESTERN TOOL & STAMPING CO.
Des Moines, Iowa

IOWA DISTRIBUTORS
FOR MARSHALLTOWN LINE OF PRESSES
WESTERN TOOL & STAMPING CO.
Des Moines, lowa

**Boosting Grinder Production** 

A manufacturer of cylinder valve seat inserts for aircraft engines had been grinding 500 pieces per hour on one machine. In seeking to step-up production he found a "bottleneck" in an extra demagnetizing and cleaning job after grinding.

During the grinding operation, the valve seats became strongly magnetized from the magnetic chuck—and had to be demagnetized to get rid of cling-

ing ferrous particles.

In telling about the incident, Mr. Litwin of Electo-Matic Products Co., 4036 N. Kolmar Ave., Chicago explained that installation of a "Neu-T-Rol" magnetic chuck control made it possible to raise production to 900 pieces per hour—releasing the pieces promptly from the chuck, eliminating prying loose of the parts as well as demagnetizing and cleaning operations.

A Canadian Company had always experienced difficulty demagnetizing small watch and clock pins after grinding. Their experience was similar to that already related. Another Company using many extra large dies had tried to purchase a demagnetizer big enough to use on them. They had been dismantling dies after grinding, to demagnetize the punches. It was advantageous for them to install a magnetic chuck control which released and demagnetized the heavy pieces at one operation.

'Neu-T-Rol" equipment is made for all sizes of magnetic chucks, and where it is specified on new grinding equipment, the manufacturers will build it in, ready for use. It can be installed easily on grinding machines that are already in service. Helpful on smaller machines, it is particularly useful on the larger sizes of magnetic chucks where work pieces are heavy and it is otherwise necessary to use considerable physical force at times to pry parts loose. Such extra exertion tires and exasperates the operator and prompt release of parts from magnetic chucks is one of the first steps in raising grinder production rates. It saves wear and tear on the operator, the parts and the chuck face. Often it saves an extra demagnetizing operation,

# A PRODUCTION OF THE PROPERTY O

When you buy a Marshalltown Press, you get a press that is designed and built for extreme dependability, and a press that is an outstanding value. Features of design include more die space, chrome nickel cranks, wrist pin connections and many other proven advantages.

Write today for literature about Marshalltown Presses — available in capacities from 5 to 70 tons.



NO. 5 FLYWHEEL TYPE

MARSHALLTOWN MFG. CO. 900 E. NEVADA ST., MARSHALLTOWN, IOWA

#### Form Shaping With Duplicator Control

Automatic form cutting with a shaper, through the use of a form duplicating control is an interesting cost and time saving development recently introduced at Peeress Pattern Works. Detroit. The idea arose from a problem of machining the sides of a quantity of magnesium crank case and barrel core boxes to provide for the application of steel wear plates.

Normally such a job would be milled with frequent checking with a floor-to-floor time of roughly three hours per piece. At Peerless however, a die duplicator produced by Detroit Universal Duplicator Co., 229 St. Aubin St., Detroit, was hooked up to a shaper, a template of the form provided, and machining time reduced to about 30 minutes (a saving of better than 80

percent).

Checks indicate, according to Peerless, that a consistent accuracy of within .002" is being maintained in the operation. The duplicator which had been used previously in the same shop for controlling other work requiring duplicating, was merely moved to the shaper and connected with the table

As shown, the steel template conforming to the shape of the core box, is mounted on the table of the machine. A tracing finger, supported by a tracer head mounted with a bracket on the shaper, follows the contour of the template, controlling vertical feed, while transverse feed is automatically governed by the setting of the shaper.

elevating mechanism.

The work itself is clamped in duplicate to the table parallel to the tem-

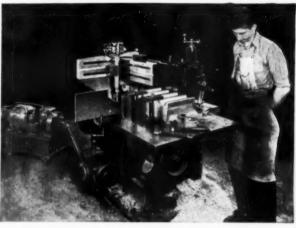
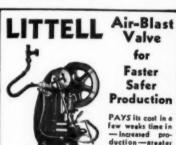


plate so that several pieces can be machined at one time.



few weeks time in — increased production — greater safety — economy of air. Automatically ejects pieces. Operator's hands are never in danger zone. Quickly adjustable air norzie.

Automatic Roll Feeds—
dial feeds, magazine feeds, hopper feeds, for punch
presses. Reels for coiled stock. Send for Circulars.

F. J. Littell Machine Co.

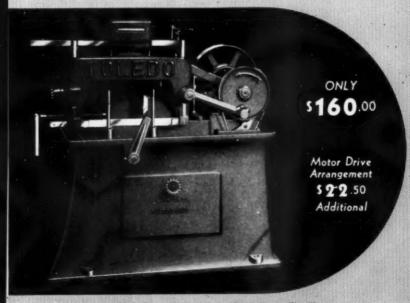
# HIGH SPEED POWER HACK SAW

# Quality at Low Cost

IMPROVED DESIGN - HEAVY DUTY - FAST CUTTING. A REAL SAW THAT WILL SAVE YOU TIME AND MONEY.

To start cut, relieve weight of saw frame, hold down on release lever and lower saw to work – start machine. Automatic trip stops the machine on completion of cut. Automatic relief of saw blade on the non-cutting stroke is also provided.

Capacity 6"x6" with 10" to 14" blades — Clutch Pulley 12"x3" — Speed of Pulley 120 r. p. m.



L-W CHUCK CO.
1-7 N. ST. CLAIR ST., TOLEDO, OHIO

# CHICAGO MOUNTED VT SUP

### 150% LONGER LIFE

Chicago Mounted Wheels made of the new V/T Super Bond prove by tests corducted in many plants on snagging and exacting operations to have from 150% to 300% longer life. They're tougher; can take more punishment; grind morpieces per wheel, faster and without sacrifice of cutting action.

V/T Super Bond holds its original shape longer. Wheel will not ridge o grinding welds, sharp corners, sinking dies, barbering, and other wor of this character.

"CHICAGO" MOUNTED WHEELS NA PRODE DOWN ON THE CHART ARE ACTUAL SAFE CHICAGO WHILE & MFG. CO.

V/T Super Bond meets the challenge of today's exacting requirements. Cut your grinding cost. Let up prove it to your own plant on your toughes mounted wheel job.

Let us send you one of thes Mounted Wheels without coor obligation. Tell us the kin of job, type of equipment an size you want to use to mak your own test.

Complete Catalog Free upon Request.

# FREE MOUNTED WHEE CHART

Ideal for ready reference in th shop. A Wall Chart 22x15 showing actual size and shar of every standard Chicag Mounted Wheel.

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Canadian Distributors: Canadian Trade Corp., Ltd.

R BOND:

### GREATEST FORWARD STEP IN 30 YEARS

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V/T Super Bond is one of the most important developments in mounted wheels. Wherever the use of a tough, hard bond that will stand the gaff is required, V/T Super Bond will be found without peer. Nothing can compare with it in endurance, stamina and performance. There is a shape and size to handle every grinding job faster, better and at lower cost.

#### Chicago Mounted Wheels

The FIRST small abrasive wheels mounted on steel mandrels to be offered to industry.

The FIRST with this special new and exclusive bond — V/T Super Bond, unequalled in strength and long life.



#### **HANDEE TOOL OF 1001 USES**

Here's a small "power house" that can be carried to any part of the shop and used wherever there is an electric outlet. Repairs hard-to-get-at parts on machinery without removing the part—smooths off rough spots on dies and moulds—cleans delicate mechanisms—grinds, drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, cleans, etc. Uses 300 accessories. There are more Handees in use today than all other tools of this type combined.

De Luxe model weighs 12 oz. 25,000 r.p.m. \$18.50 postpaid with 6 Accessories.

#### TRY A HANDEE FOR 10 DAYS IN YOUR OWN PLANT

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- ☐ Free Wall Chart
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Method for Motorizing ERS and DIE SINKERS

> BRACKETS CARRIED IN STOCK FOR MOTORIZING ALL KINDS OF MACHINES

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### USEFUL

#### In Any Modern Shop

This sturdy 36"x48" Milwaukee Surface Plate is of semi-steel construction, accurately machined, provided with cross ribs every 10%" for rigidity, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate30". Shipping weight 1100 lbs.

We also make larger and smaller plates either with planed or scraped surfaces which ever is desired.

Write today for full information.

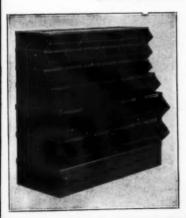
#### J. C. BUSCH COMPANY

ENGINEERS AND MACHINISTS SINCE 1907

E. Pittsburgh Ave. and So. Ferry St.,

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### ■PARTS STORAGE— WHERE YOU NEED IT



Especially useful where parts or materials must be kept accessible at the jeb. Stackbin sections stack together to form permanent or temporary stockrooms. Sturdy steel sections can be set up quickly—moved, dismantled or added to easily—sny place they're needed.

In the stockroom, patented Stackbins are the perfect solution to the problem of keeping a wide variety of parts within instant reach.

See for yourself how Stackbin sections speed up storage and handling—how they can save you real money. Write Stackbin Corp., 55 Troy St., Providence, R. I., for full details and low prices.

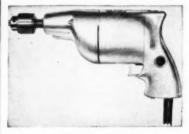
STACKBINS

"STACKED AND STILL ACCESSIBLE"



#### Black & Decker Introduces New Tapper

With the introduction of the Tapgun to the line, Black & Decker Mfg. Co., Towson, Md., now have three powerful, one-handed, high speed production tools of identical grip, build and balance:—Holgun Tapgun and Scrugun.



The new Tapgun weighs only 3-¾ lbs., measures 9-¾ over all, taps up to 5/16" in cast iron, 3/16" in steel, ¾" in brass or aluminum. It taps at 400 r.p.m. and backs out at 525 r.p.m.

This tool augments the No. 22 Tapper which has been in the line for some years, which is a heavier tool for greater capacity. The No. 22 has a capacity of 3%" in cast iron, 34" in steel and 3½" in brass or aluminum.

The Holgun and Scrugun are a powerful ¼" drill and a high speed screwdriver for screws from No. 4 to No. 10.

#### Hanna Announces New Models

The line of electric-hydraulic riveting presses manufactured by Hana Engineering Works, 1765 Elston Ave., Chicago, Ill., has been augmented by the type shown.

In its design, the required floor space has been held to the minimum. Motor, pump, controls, piping, cylinder, and reservoir are totally enclosed which permits the motor being of the open frame type and results in a complete, streamlined machine.

Front and rear panels may be removed in less than a minute to make motor, pump, and reservoir accessible. A side panel affords access to the controls. The entire machine can be lifted out of its base without disturbing a hydraulic, electrical or mechanical element.



From one to six or more rivets may be driven simultaneously, with equal pressure exerted on each rivet, regardless of variation in length, hardness of rivet, or ordinary variation in grip. Omission of one or more of the rivets will not result in damage to the work or the machine.

Work assembling, loading, aligning, clamping, and rivet nesting features may be built in as shown. The work is illuminated by built-in lamps.

Tonnage adjustment and gauge are directly before the operator's eyes as is the oil level sight glass. Live or driving dies may be above or below. A complete riveting stroke of all dies can be accomplished in less than two seconds. Equipment is available in capacities from 10 to 100 tons.

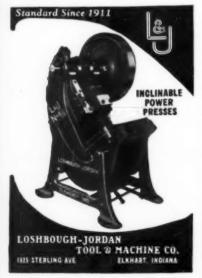




#### DEARBORN Automatic Chucking and Indexing Fixture MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN 72 S. CLIFF ST. ANSONIA, CONN.



#### Red Band Diamond Dressers

The Abrasive Dressing Tool Co., 1550 Broadway, Detroit, announces a new line of diamond tools known as the Abrasive Red Band series, positively identified with a brilliant red band on the shank. In addition to the "Oxide-Free" process which is claimed to secure the diamond in the tool for the entire useful life, other production methods are followed to incorporate economy and long life.

A feature performer is the No. 11, designed for versatility of application as well as general utility. It contains three rows of diamonds, precisely staggered and spaced to permit the tools to be used for single-stone or cluster-type dressing. By regulating the dragangle, a single stone, or three stones may make contact with the wheel. It can be used for large radius trueing surface grinders, medium cylindrical grinding and all other tool-room dressing.

No. 11 contains 11 diamonds, weighing approximately 1.25 carats.

#### **Hartley Expands**

Hartley Wire Die Co. formerly of Waterbury, Conn. has removed to larger quarters at Thomaston, Conn., increasing by approximately 15,000 square feet, their floor space formerly available.

The Company, producers of Carboloy dies for drawing, sizing and extruding purposes, recently celebrated its 90th anniversary, and is said to have been the first organization in this country to make diamond dies.



## "CHAMPION" Steel Racks

Save time, steps and money by keeping bar stock, shafting and pipe out of the way and off the floor.

Write for full details.

The Western Tool & Mfg. Co. Springfield, Ohio

#### Dremel Electric Jig Saw

A handy new electric jig saw has been developed by Dremel Mfg. Co., Racine, Wis., which falls into the category of things somebody ought to have thought of before.

A powerful little electric motor provides 7200 saw strokes per minute and the makers assert that it will cut at the average rate of a foot per minute through \%" to \%" medium hard wood.

Just a trifle heavier than the regular hand scroll saw and better balanced, a light feed pressure suffices and the cut is said to require no sanding. Current consumption is stated to be less than 75 watts and the low price brings it within reach of all.

The usefulness of such a device in intricate and delicate pattern making is obvious. It will handle easily, jobs that are difficult on ordinary bench saws. A touch of the button switch built into the handle starts the saw. Release of the button stops the blade.

There are only two moving parts and





### LAP RADII and ANGLES

on Carbide Tipped Tools - to precise settings on the Diamond Dust Loaded Special Iron Disc of the

#### LAP-RITE

Get Maximum Results in Tool Life -Production Speeds, and Product Finish from your Carbide Tools by lapping them on this popular lapping machine.

Investigate this compact, complete, and moderately priced device.

Fully Equipped: Weight - 85 pounds Height - 15 inches

Diameter- 14 inches

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#### THE LAP-RITE SALES CORPORATION Post Office Box 452

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Choice of Two Standard Speed Ranges: 100-1000 R.P.M. or 150-1500 R.P.M. GROUND SPINDLE OF HEAT-TREATED STEEL

Every Job

mounted on TIMKEN TAPERED ROLLER SEARINGS Height overall—58" Weight—650 lbs.

Motor—1/1 or 1/4 H.P.—1750 R.P.M.—60 cycle
The VERNON No. O MILL Can Be Furnished as
Above or with hand-screw feed or combined handscrew feed and longitudinal power feed.

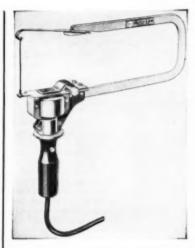
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The Vernon Line of Northern Machines.



MACHINERY MANUFACTURING CO.

3828 INVING STREET, VERNON, LOS ANGELES, CALIFORNIA



oiling is not required. Weighs 17 ounces and saws to the center of a 20" panel. Turning of a knurled nut adjusts blade stroke from 1/8" to 5/16", for cutting different materials. The saw kerf is about the width of a pencil mark.

#### Storage Battery Emergency Lamp

A light for locations, where no electric current is available or where it is hazardous to introduce long, power extension cords, is introduced by the Stewart R. Browne Mfg. Co., Inc., 258 Broadway, New York, N. Y. In case of power failure, operating independently of all power circuits, this Model SB-100 storage battery emergency lamp, can be used for light until normal service is restored. It can be used safely when it is dangerous to use any other kind of light, for repairing leaks in gas mains; working on pipe lines; entering tanks or vessels containing inflammable liquids.

All of the joints between the two parts of the battery case, the lamp and the lens holder, the case and the cord of this Storage Battery Emergency

Lamp are sealed and a vapor-proof switch protects against ignition of explosive gases or vapors.

A special laminated and shatter-proof lens, strong enough to resist a severe



blow, protects the light bulb. A second refractor lens, which more uni-formly diffuses the beam, is mounted in the same holder with the shatterproof lens. Spillage of acid is avoided by a unique design of battery plates which involves the principle of capillary attraction.

Fostoria "Localites" A new 24-page bulletin (ML-25) introduces the extensive line of industrial lighting equipment produced by Fostoria Pressed Steel Corp., Fostoria, Ohio

Individual lights for a broad range of machines, tools and equipment are shown, with mounting brackets of all kinds. Included are many of the new fluorescent lamps for adjustable bracket and canopy mounting.

#### SELLSTROM EYE PROTECTORS

Bring real COMFORT to workers through lighter weight, bet-ter ventilation and perfect FIT added to scientific exactness. Fosters steadier work during shorter work days, Goggles\_ Helmets-all types of industrial Eye Protection at its best-

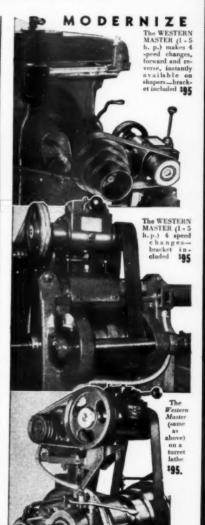
#### SELLSTROM MFG, CO.

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CHICAGO



No. 227 Helmet Write for latest Catalog.



nd for complete information regarding larger sizer

WESTERN MANUFACTURING CO. 3404 SCOTTEN AVENUE DETROIT, MICH

#### TROYKE ROTARY TABLES



Moderately Priced

Made in 9\*, 12\*, 15\*, 18\*, 21\*, 25\*.
With or without dividing plates.
Ask your dealer or write us for complete catalog.

ALFRED A. TROYKE 4422 Appleton St., Oakley, Cinc., Ohio

#### Hartford Bench Taper Gage



This gage has been developed to not only meet tool-room requirements, but manufacturing remirements.

It is made in a most substantial manner of the best materials. The gage plates are hardessed and ground. In operation the gage sets on a bench convenient to the workman. It is adjusted to the height of his eyes, and placed so that he looks toward the light through the gage. The gage plates are set to a master plug gage. It is found much more accurate and rapid to operate than a ring gage.

Height to center line of gage: greatest, 30% in.; least, 23% in.; weight, 23 lbs.

Capacity - From nothing to No. 14 Brown & Sharpe taper.

Built and sold by

The Hartford Special Machinery Co. HARTFORD, CONN.

#### Speed Increasers

A new 24-page illustrated booklet describing the complete line of type SU speed increasers is announced by Westinghouse. These units are designed especially to supply output speeds in excess of those which can be directly obtained with economy and safety from ordinary prime movers.

In successive sections, the ring bound, heavy cover booklet presents application data, construction features, views and explanations of modern manufacturing processes employed, four pages of tables and sketches giving complete dimension information, ordering instructions, and pictures of successful applications.

Flow diagrams, fully described, explain the positive pressure lubrication system used. A full four pages devoted to application data contain tables of input and output r.p.m., horsepower capacities, and explanatory paragraphs on how to use them in selecting the correct gear unit.

Copies of descriptive data booklet 3650 may be obtained from Dept. 8-N-48, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

#### Weldon Adds Tu-Lip Counterbore

The Weldon Tool Co., 3000 Woodhill Road, Cleveland, Ohio announces acquisition of the Tu-Lip Counterbore formerly made by Gopher Machine & Tool Works Co., Minneapolis, Minn. Henceforth it will be known as the Weldon Tu-Lip Counterbore, and will be manufactured and distributed exclusively by Weldon.

# OPEN THE WAY TO GREATER PROFITS BY USING SES HINGES

BUTTS AND CONTINUOUS LENGTHS — for GUARDS — CABINETS — CASES — BOXES — LUGGAGE
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S & S MACHINE WORKS

4539 WEST LAKE STREET

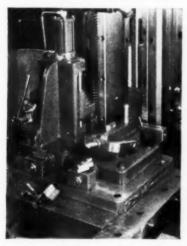
HARDWARE DIVISION

CHICAGO, ILLINOIS

#### Series of Operations on Single Broaching Machine

Broaching frequently permits the performing simultaneously on a single machine of a number of machining operations on the same part—normally requiring multiple machines and fixtures. A typical example in one of the major automobile companies is shown.

The part is a shifter fork for an automobile transmission. The various machining operations required were:—



 Flat machining of three adjacent faces of a double-L shaped guide follower.
 Sinking a large diameter radius contour into one of these faces.

All operations are performed on a single Colonial broaching machine, at the rate of 120 complete parts per hour, by equipping the machine with two fixtures and two sets of broaches, between which are split up the various machining operations.

Fixtures and upper parts of the multiple broaches are shown in the illustration. The various steps in machining are illustrated by the three parts in the foreground. At left is the rough forged part. Center front is the part

## GOOD NEWS ABOUT Universal DRILL BUSHINGS & SCREWS

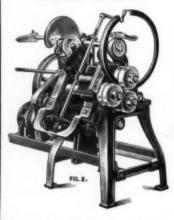


Universal Screws made from nickle steel and cadmium plated, are now available in boxes of 100 and may be ordered for your stock room. Universal Drill Bushings are superfinished to insure accuracy and unexcelled wearing qualities. Made to A.S.A. Standards, available in all standard sizes.

## UNIVERSAL

Engineering Company Frankenmuth, Mich.

## EXCELSIOR No. 14 ANGLE ROLLING MACHINE



Capacity 2x2x¼\* Angles. All the rolls are direct driven avoiding slipping of the material between rolls, which are operated by the oversize Excelsior friction clutch. Write for Price and Testimonials.

We specialize in Automatic Grinding and Polishing Machines, to polish Stainless Steel Sheets, Automobile Bumpers, and parts, Stove and Range Top Castings, Electric Iron Sole Plates, etc.

Also Inside Cutting Shears, Deep Throat Power Punches for duplicate work by the use of horse shoe templets up to No. 12 gauge. Used in Stove, Range, Air Conditioning and Kitchen Equipment Plants.

#### EXCELSIOR TOOL & MACHINE CO.

East St. Louis, Illinois

after machining the inside faces of the "L" On the right fixture adjusting block is the shifter fork part with the third surface and radius contour finish broached.

The first group of cutting operations is performed with the part in the left hand fixture. This fixture is air-operated for clamping the part after locating it over a stud by means of the shifter rod hole. It is manually controlled. The right hand fixture may be manually operated. Here, locating again is by means of the shifter rod role.

The fixture table is of the "receding" type, synchronized with machine ram travel to retract fixtures and parts for unloading and reloading during the return stroke of the broach carrying ram.

Productivity is approximately 120 pieces per hour per station. The machine is a 6 ton single ram with 36" stroke. Cutting speed is 30 feet per minute with hgh speed—60 feet per minute — return. Machine, fixtures, and broaches were designed and built by Colonial Broach Co., Detroit.

#### N. I. A. A. Advertising Clinics

Marketing problems of industry will be threshed out at 10 three-hour clinics at Hotel Statler, Detroit, during the three-day Conference of the National Industrial Advertisers Association, Sept. 18-20. Demands of N.I.A.A. members throughout the country for more time at annual meetings for serious discussions of basic advertising topics and marketing aids brought about the scheduling of these sessions as the backbone of the entire Conference program.

The clinics will supplement two general sessions at which N. I. A. A. members, guests from affiliate advertising organizations and business executives will study industry - wide advertising problems, especially those which have gained importance since the acceleration of national defense plans.

At each of the clinic sessions intimate study of specific advertising problems will be directed by specialists who are working in local groups to gather and

### OLIVER DIE MAKING MACHINES WILL SAVE YOU MONEY —

Produce those rush jobs on time-

Enable you to use less skilled labor. Save 50 to 60 % of the labor on

Dies, Gages, Cams, Stripper plates, etc., as compared to hand methods.

PRICED AS LOW AS \$125.00 SEND FOR LITERATURE.

"We also build Drill Grinders, Tool and Cutter Grinders, Tap Grinders, Point Thinners



OLIVER INSTRUMENT CO. 1408 E. MAUMEE ST., ADRIAN, MICHIGAN, U.S.A.



#### MAKE YOUR DRILLING JOBS EASIER

Increase Profits . . . Speed-up Production End Worker Fatigue . . . Increase Efficiency

by using this

#### DRILLMASTER RADIAL DRILL

Economical in operating and first cost, this floor type, heavy duty, precicion-made, well-balanced Radial offers many features that merit your careful consideration. Drilling to the center of a 36° circle, No. 2 Morse Taper and heavy duty ½ HP ball bearing motor. The full floating, ball bearing spindle assures free and sensitive operation at all speeds.

Send TODAY for bulletin giving full details.

Wm. C. Johnson & Sons Machinery Company St. Louis, Missouri





and handling cost and assures prompt, complete shipments. STEELGRIP Lacing-Buses, easily applied with hammer. WIREGRIP Belt Hooks-6 sizes of tough selected steel hooks on convenient aligning card - saves hooks, no loss from short card ends . . . every hook used. Write for catalog.

#### ARMSTRONG-BRAY & COMPANY "The Belt Lacing People"

315 N. Loomis St., Chicago, U.S.A

correlate material for the discussions. District chapters in virtually every important industrial area in the United States have each assumed responsibility for one of the ten clinic sessions and will conduct the discussion on the assigned subject.

#### Halco Universal Hi-Speed Head

Milling, drilling, boring and counter boring on any angle—that's the field covered by the new universal head, developed by Halco Products Co., Detroit, Mich.

The highlights include a sturdy hardened spindle, ground to precision limits, with No. 7 B&S taper for all standard mills—capacity h" to ½" diameter. Also equipped with draw bar for Wellon type holder or collets. (Collet equipment is extra.)

Three radial thrust SKF precision flush ground ball bearings are provided in the substantial housing.

A sturdy cast iron dove tailed slide, precision machined, provides 4" travel and a positive locking stop. An adjustable gib compensates for wear.

A heavy 3/4" ground screw with 10pitch Acme threads is fitted with heavy bronze nut for accuracy and durability. Ball thrust end bearing and adjusting screw take up back lash. Hardened spiral gears are provided for vertical travel.

The heavy overarm clamp is graduated to 360°, bored to fit any mill fitted with spreading screw for easy mounting.

Motor is of the heavy duty G-E ball

#### AN INEXPENSIVE ABRASIVE BAND GRINDER



#### "Built Like A Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite lubrication, complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

#### WALLS SALES CORP.

96 Warren St., New

New York, N. Y.

bearing type, 1/3 h.p., 110 volt 60 cycle—easily reversible for left hand cutters. Speeds—500 to 2900 or 350 to 2400 r.p.m. Eight speeds, 200 to 2900 r.p.m. available at extra cost. The unit is also available with a 10-speed back gear.



Weighing approximately 90 pounds, the unit can be mounted easily by one man. The 4" vertical travel permits completion of many drilling, milling boring and facing operations in a single setup. The makers assert that the original units were rigorously tested for 1½ years before being placed on the market, and that more than 75 installations are already in service. They also emphasize an unconditional sixmonths' money-back guarantee.

#### Hotel Essex

Guaranteed comfort—and we mean it.
 Latest colored tile combination tub and showers—newly furnished and decorated thruout—You'll like it.

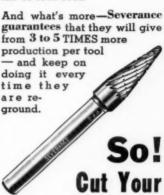
\$1.75 SINGLE \$2.50 DOUBLE

Ellis at Larkin

San Francisco, Calif.

## GROUND To Give Keenness

these Midget Cutters often give 7 to 10 times the increase in production per dollar of tool cost.



Rotary Filing costs like one \*Chief Executive who writes, "It will cut our tool costs at least three-quarters."

Write for Catalogue No. 12. Every Tool Man—Supervisor, Engineer or Designer—will want this little booklet, so pack full of time and moneysaving ideas.

Profusely illustrated, it shows many unusual cutters and applications, lists Standard Midget Milling Cutters, "Chatterless" Countersinks, Tube Burring Cutters and Inside Burring Cutters as originated by

\* Name on Request

Severance Tool Mfg. Co. 1510 E. Genesee Ave., Saginaw, Mich.



## New Britain UNIVERSAL VISE



NEW BRITAIN TOOL & MFG. CO. NEW BRITAIN, CONN., U. S. A.

#### **Illuminating Restricted Corners**

"Light piping" properties of "Lucite" (methyl methacrylate plastic), which surgeons have found so useful for introducing direct, "heatless" illumination into body cavities, now are utilized in industry, it is announced by E. I. du Pont de Nemours & Co.

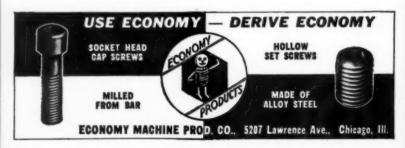
The new instruments function in substantially the same way as surgical instruments. They make it possible to illuminate spots inaccessible to flashlights or other more conventional apparatus. "Lucite" actually transports light around corners, therefore the rods are curved for penetration into obstructed and restricted nooks.

Light originates at the handle, where a metal base holds small, standard-type flash batteries. Interchangeable rods of three different shapes are provided.

Although the instrument looks like the finest crystal, it is non-shattering and may be used safely around machinery and heavy tools.

The principle that makes the new illuminating device possible is called "total reflection." "Lucite" rods can be cast with surface smoothness comparable to that of a ground lens. Light rays introduced at any point will reflect through the interior and emerge only where the smooth surface has been interrupted by an embossment.

The industrial instrument sets are being manufactured by the Hitchell Co., Boston and the Emeloid Co., Inc., Arlington, N. J.



#### Cutter and Tool Grinding Attachments

Two new pieces of auxiliary equipment have been developed by Brown & Sharpe Mfg. Co., Providence, R. I. These are for use with their No. 10 Cutter and Tool Grinding Machine, and their No. 13 Universal and Tool Grinding unit.

They are of particular value in sharpening peripheral teeth of steep spiral end mills having straight or taper shanks. A knob at rear end of attachment spindle facilitates holding the tooth being ground in contact with the

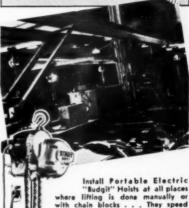


tooth rest while feeding the cutter across the wheel by longitudinal table movement. Mounting of spindle on antifriction bearings provides a sensitive, free-turning unit, of especial advantage when sharpening very small end mills having a steel spiral.

The attachment is carried in a body, which is supported by, and turns horizontally on a base casting. Two zero lines 180° apart assure proper alignment of spindle with table of machine, when sharpening either right or left hand cutters, the base itself being aligned by keys which fit the table T-slot.

End mills having a No. 9 B&S taper

## MECHANIZE YOUR



where lifting is done manually or with chain blocks . . They speed the work, reduce waiting time of men and machines, and promote efficiency . . They are the first step towards mass production methods!

"Budgit" Hoists come in sizes to lift loads up to 250, 500, 1000, and 2000 pounds with speeds to suit today's tempo. . You can afford "Budgits"! Prices start at \$119, and there's nothing else to buy . . You simply Hang up, Plug into the nearest electric socket and use!

Send for catalog containing complete information, also "Time Savings Calculator" that shows savings they earn.

### SHAW-BOX CRANE & HOIST DIVISION MANNING, MAXWELL & MOORE, INC.

435 BROADWAY . MUSKEGON, MICHIGAN



Makers of all types and sizes of Electric and Hand Operated Cranes and Electric Hoists... Send all your crane and hoist inquiries to "Shaw-Bax"?

Portable Electric
"BI IN.IT" HOISTS

#### Champion Expanding Mandrels



1/2" to 61/4" Efficient-

Dependable-

Write for catalog

THE WESTERN TOOL & MFG. CO.

Springfield

## -GEARS

Spur-Helical-Worm-Bevel-Miter, Etc.

We do broaching and all kinds of grinding.

We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

#### TAYLOR MACHINE CO.

1919 E. 61st St.. Cleveland, Ohio



shank fit directly into the attachment spindle, while cutters with other tapers and straight shanks are accommodated by stock collets and adapters available at extra cost.

The illustrations show the No. 10 unit sharpening a left hand spiral cam lock end mill and the sharpening of double end mills in the No. 13 unit, using a spring collet and drawn-in bolt.

#### Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods, 7 sizes U.S.S.-Inexpensive last for years.

Write for Circular NIELSEN TOOL & DIE COMPANY 1859 Gardner Ave. Berkley, Mich.



#### GOOD NEWS! for DIE MAKERS

Transfer Points Eliminate Guesswork in Die Making

There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in ¼° to 1° diameters. 3/169 81.50 per set 5/16<sup>1</sup> 81.25 per set 3/8<sup>2</sup> 1.35 1 81.40 per set 7/168 1/40

HEIMANN MFG. CO.,

URBANA, OHIO

#### Skilled Personnel

A current survey conducted by Ford R. Lamb, Executive Secretary, A. S. T. E. reveals a really serious shortage of tool engineers, as well as skilled tool and die workers an d mechanics

Figures are not complete and Mr. Lamb points out that it is high time a distinction be made between "skilled'' mechanics and other types of production labor. He believes there is too much popular confusion between "machine operators" who are only semiskilled, and the really skilled workers.

He explains that a machine operator can be made out of almost any young fellow who is reasonably han-

dy, in a relatively short period of time, with proper training and schooling. But it takes experience to prepare expert mechanics.

During the past 10 years, we have witnessed the greatest decline in the standards of skill in our industrial plants since the inception of real industrial production in this country. For years, apprentice training was practically at a standstill.

The equipment at many of our vo-



cational schools is so antiquated that the men are learning only the rudiments of "tending" machinery.

"Antiquated lathes that will cut metal at around 50 to 75 feet per minute, may be all right to teach a man what a lathe looks like, in general." "But," says Mr. Lamb, "put him on a modern production machine with modern tooling from which the chips fly at rates up to 400 feet a minute and all you'll get out of him for a while will be a look of blank amazement."

#### Lincoln Diesel Welder With Gasoline Engine Starting

Gasoline engine starting on diesel driven are welders, announced previously on a 300-ampere unit by The Lincoln Electric Co., Cleveland, Ohio, is now available on a 400 - ampere model.

This provides easy starting in any weather, along with the inherent diesel economies.

According to field reports quoted by Lincoln, the diesel welder cuts fuel costs 33% to 86%. Total savings run as high as 40 cents per hour. Fuel oil consumption is 1.5 galions per hour at full-load operation compared with 2.75 gallons of gasoline with conventional engine driven welders.

In addition, the diesel engine compares favorably with gasoline engines in simplicity, weight and cost, as well

as operating speed.

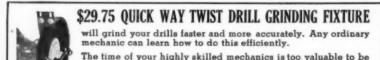
The starting engine is a small auxiliary mounted above the diesel. It is hand cranked and a belt drive, clutch-engaged, connects the starting engine to the diesel. Starting in extremely cold weather is facilitated by having the cooling system of the small starting engine connected into the cooling system of the diesel. This permits warming up the diesel by running the starting engine a short time and allowing the heated water to circulate through the diesel engine.



Of 400-ampere capacity, the "Shield Arc SAE" welding generator used on the new diesel welder is equipped with "dual continuous control" and all of the other advanced Lincoln features.

Information on Metal Spraying

Metallizing Engineering Co., Inc., 21-07 41st Ave., Long Island City, N. Y., announces the first issue of Metco News—a periodical devoted entirely to the latest developments and applications of the metal spraying process. All those actively engaged in the maintenance, salvaging or manufacture of metal products or equipment may obtain copies without cost.



wasted hand grinding drills.

For further information address-

INDUSTRIAL ENGINEERING CO., INC.
730 Hennepin Avenue, Pence Building, Minneapolis, Minneapol

#### Below The Border

American manufacturers don't have to wait for formation of a trade cartel to begin competing successfully with European countries in South America savs Irving Tow, head of the Tonsa chain stores in Argentina and a pioneer in the chain store development of that country.

He believes our manufacturers o f radios, electrical appliances, refrigerators, etc., have sufficient husiness skill to sell their wares to Latin America despite low prices, generous credits and bartering methods that have marked commercial infiltration there by other countries.

Americans c a n meet this with ingenuity, enterprise and proper application of the vast facilities of mass merchandising now at

their disposal. Mr. Tow, who is a native of this country, considers American merchandising methods the most efficient and the most successful in the world. Applying the retailing methods that have made the development of chain stores in the U. S. and Canada "a natural step in the industrial growth of this country," he predicts that North American exports will be increased. Chain store merchandising methods are being developed rapidly in Argentina and other Latin American countries.

The firm Mr. Tow will represent in



#### AMES DIAL INDICATORS

Highly sensitive instruments for indicating size variations in tenths of thousandths. Rugged, modern in design and of highest quality. Various sizes and designs shown in catalog. No. 51. . . . . Send for copy now.

B. C. AMES CO. . Waltham, Mass.

Buenos Aires has already placed orders in South America for slippers, alligator and snake skin bags, foodstuffs and other products. These will be distributed through stores in the U. S. At the same time he is planning to distribute through stores in South America, some of our typical mass production items, thus creating a two-way traffic. Mr. Tow admits that two-way trade is a real challenge to the ingenuity of American business men, but he has confidence they can meet the challenge.



Headquarters for Standardized Die Sets. embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalon.

#### E. A. BAUMBACH MFG. CO.

1810 So. Kilbourne Ave.,

CHICAGO, ILL.

## WHEN BUYING CUTTERS



As Cutter Specialists since 1919 we are able to offer the highest quality and service at attractive prices.

Write today for prices.

Few Territories Open.

QUALITY TOOL WORKS WAUKEGAN. ILLINOIS

#### Jessop Non-Magnetic Steel

A non-magnetic, free machining allov steel possessing low magnetic permeability with superior mechanical properties has been developed especially for the electrical industry by the Jessop Steel Co., 603 Green St., Washington, Pa.



Jessop non-magnetic steel has a magnetic permeability of only 1.003 to 1.006 at 1000 Oersteds magnetizing force at temperatures from sub-zero to boiling. The illustration shows a piece of electrically magnetized iron at the right and a piece of non-magnetic steel at the left. Note that the lines of force (shown in iron filings) are all directed to iron sample at the right.

Another desirable property of this steel is its high electrical resistance (69 to 71 microhms per centimeter) which considerably produces eddy current lesses.

In the annealed condition, this steel has a tensile strength of 80,000 to 110,-000 lbs. per sq. in.; yield poitn, 35,000 to 60,00 lbs.; elongation in 2 inches, 25 to 50%: reduction of area, 30 to 60%: Izod impact value (at room temperature)), 80 ft. lbs.

The steel can be formed readily, welded, machined or blanked. It can be used in transformer, controller and switch covers; entrance plates; spac-ing bars; end fingers; and numerous other parts of electrical equipment.

#### Lessons In Welding

Here is a book that's especially helpful for beginners learning to arc weld.

It will also benefit experienced welders desiring the comprehensive practical information presented.

Welding officials, such as supervisors, foremen instructors and will find it a ready reference to fundamental in formation on arc welding and a guide to its proper application.

"Lessons in Arc Welding" is a series of 51 lessons, based on the ex-periences of Ar-thur Madson, Instructor of the Lincoln Arc School. Welding presenting facts a n d knowledge that will enable the welder to use arc welding processes successfully and economically.

There are four principal sections:

-Welding with Unshielded Arc Electrodes; Welding with Shielded Arc Electrodes: Electrodes for Particular Joints and Metals: Hardfacing.

Nineteen lessons comprise the first section, starting with the arc welding machine; its control; striking the arc and running horizontal bead; weaving or movement of electrodes; effect of arc length, amperes and speed on bead,

Nine lessons cover the use of shielded arc electrodes.



#### FOR ALL MAKES OF MACHINES

Adjustable and Solid

**Adjustable Spacing** Collars

For straddle milling, gang milling and multiple slotting set-ups. They eliminate the use of shims.

Solid Spacing Collars Are standard .001" to 3" thick. Less than 1/8" are not hardened.

SCULLY-JONES and COMPANY 1905 S. Rockwell St., **ILLINOIS** CHICAGO.

Electrodes for particular joints and metals are covered in 15 lessons.

Eight lessons are devoted to hard facing, embracing the building up of steel parts to resist shock, abrasion and impact.

The book may be obtained directly from The Lincoln Electric Co., Cleveland, Ohio. Price is 50c per copy postpaid anywhere in the U. S. A., 75c elsewhere.

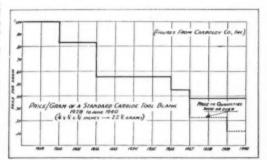
It comprises 136 pages. There are numerous drawings and photos.

#### Carbide Tool Costs Declining

A most striking example of the effect of inc re a sed production and demand on costs, is revealed by the accompanying chart showing prices of cemented-carbides for cutting tools over the past 10 years, during which their use has enormously increased — particularly for steel-cutting.

Since 1930, it will be noted, price of a typical standard blank of the metal has dropped to the

over 60 percent (from \$1.00 to 38.3c per gram), while "minimum" prices, based on large quantities have declined to almost 1/10 of the 1930 schedule, indicating potential economies available as use of carbides increases. Large increases are anticipated in connection with the current



armament program since a major characteristic of the material is to increase output per machine by permitting faster cutting of metals.

There are at present, some 80 producers of carbide cutting tools in the U. S.



Armament

A popular belief that industries like the automotive may be converted overnight to aircraft and armament production has been disputed by A. C. Wickman. Pres., A. C. Wickman, Ltd., a leading British Machinery concern.

In this country to expedite deliveries o f special equipment for British armament production, Mr. Wickman re-vealed it has been found over there that autom ob ile manufac turing equipment is more suitable for the production of trucks. cars. amb u lances and vehicles of similar nature. It has not been useful for making shells or airplanes.

Great Britain's armament, five or six years ago, according to Wickman, had declined to probably the poorest peace time state in the country's history. Germany had already been rearming for two or three years.

Wickman says that British rearming did not get under way until late in 1935. At that time, he states that 90% of British production equipment was "antiquated." In contrast today, he adds that "not more than 30 to 40% of Britain's industrial machinery is over

is your positive quarantee of dependable lubricating facilities at low cost. ROS. MFG

1860 South Kilbourn Ave.

Chicago, Ill.

10 years' old"—in comparison with the U. S. (something like 70%).

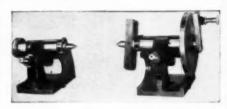
One of the keys to the rapid pickup, Wickman says, was the increasing availability of carbide cutting materials which permitted almost phenomenal increases in production per machine and per man. He was quite surprised that tool manufacturers in the U. S. do not use carbides more extensively. In England as in Germany, the machine tool industry uses carbides 100%.

#### Hart's Dividing Heads

Rapid, accurate indexing is assured by the dividing heads offered by Hart Machine Co., 26 Mather St., Dorchester, Boston, Mass. The plain dividing head is shown, mounted on 2½" fixtures. Can also be used on 1½" fixtures. Will divide into all numbers up to 16, and even numbers up to 32.

A line of milling fixtures is also offered for holding stock from

34" to 5" in size.



#### **Protecting Workers**

With the stepping up of production and great increase in the use of weld-



ing, protection against dust and fumes become increasingly important.

## YOU CAN BACK OUT BROKEN TAPS

with

#### WALTON TAP EXTRACTORS

No annealing, drilling or delaying of work.

Stock sizes from No. 4 machine screw to 11/4", in 2, 3, or 4-flute styles.

In world-wide use for 32 years on both production and maintenance tapping.

Write for Folder 131

Each Tool Must Sell Itself

### THE WALTON CO.

95 Allyn Street

Hartford, Conn.



#### Janette Speed Reducers

43 Styles\_1/50 to 10 H. P.\_.08 to 1140 r. p. m.

Janette speed reducers are compact, rugged, pleasing in appearance, easy to install or maintain, reasonably priced, built complete and guaranteed by ONE organization. As adjustments and maintenance on belts, pulleys, chains or slide rails are not necessary, delays in production can be reduced by using speed reducers. Better lighting is also possible, as overhead belts, pulleys, hangers and line shafting can be eliminated.

Ask For Your Copy of Our 100-Page Bulletin Converters \* Blower Wheels \* Motor Generators

Janette Manufacturing Company 556-558 West Monroe Street Chicago, N. U. S.



#### For PLANT MAINTENANCE Capacities 5 to 50 TONS

Patented grip prevents slipping, avoids damage, eases work in dose quarters. Alloy steel—guaranteed.

#### OTC PULLING SYSTEM

includes many sizes and types. Pushers and Pullers to install or remove gears, bearings, wheels, pulleys, sleeves, shaits, etc. Write for catalog.

SPECIAL PULLERS designed. Ask us about your special tool needs.



OWATONNA TOOL CO.

#### TANNEWITZ DI-SAW

SAVES AN AVERAGE OF \$4.80



Inside and outside cuts on
dies, shoes,
templets and
endless other
jobscan be done
in a small
fraction of the
time required
by former methods. Saws, files
and polishes. A
highly developed, large capacity machine.

Write for literature.

THE TANNEWITZ WORKS

GRAND RAPIDS - MICHIGAN









We manufacture a complete line of ELECTRIC SPOT WELDERS

from 1/4 to 500 K.V.A. for welding Brass, Aluminum, Bronze, Stainless Steel, Galvanized Sheets, Monel, Molybdenum, Tantalum, Nichrone, Tin Plate, Copper, Nickel, Silver, Gold, Etc. We can supply a Welder for any need.

Butt Welders to weld from .010° to ½° dia. metal. We invite contract Spot Welding in large or small quantities. We also make standard and Special TRANSFORMERS of all kinds. A. C. ARC WELDERS from 100 to 400 Amps.

For any further information write direct to-

CHAS. EISLER
EISLER ENGINEERING COMPANY

762 So. 13th St., (near Avon Ave.)

Newark, New Jersey

A full line of such equipment is offered by C. F. Berg & Co., 72 Dedham

St., Boston, Mass.

Constructed entirely of metal, Berg equipment is sturdy, yet light and readily portable. The suction duct system shown covers a seven foot radius giving the welder full protection from noxious fumes. Other simple, yet effective setups give protection against dust in grinding and machining operations. Engineering recommendations, based on long experience in the field are offered without obligation.

## Send for DETAILED SPECIFICATIONS OF THIS NEW HIGH SPEED VERTICAL PROFILER and MILLING MACHINE



Many new and exclusive features are incorporated in this machine designed for economical manufacture of small parts requiring accurate interchangeability.

Modern in every detail, fast, convenient.

Investigate today by writing for Bulletin 12M.

Morey Machinery Co., Inc. 410 Broome Street, New York, N. Y.

#### **Profilometer Refinements**

The Physicists Research Co., 343 South Main St., Ann Arbor, Mich., manufacturers of the Profilometer, have recently developed two new accessories for use with this instrument which is employed for measurement of surface roughness. A new instrumental modification also extends the practical applications of the Profilometer.



The first of these, known as the Mototrace is an instrument for mechanical operation of the tracer, moved across the surface to be measured. The Mototrace has four specific applications. It is used when the tracer is on very narrow surfaces or small areas where the available tracing distance is only 1/32" to ½"—in awkward places near shoulders and holes, where the tracing distance is restricted—on very smooth surfaces (e. g., 1/3 to 2 microinches) where extraneous vibration makes manual tracing difficult—in small holes

## Two Working Ends on this KOCH TEST INDICATOR

It is the only indicator with two "live" ends—for inside and outside work to .oo!". Soft and smooth in action—high in magnifying power. Rugged in construction. Can be serviced by any mechanic.

Write for illustrated bulletin.



\$<u>500</u>

THE KOCH TEST INDICATOR, 29 2nd Ave., Nyack, N. Y.

or other surfaces measured with the Type I tracer described below. Two motions are provided. The first is a constant speed linear motion, automatically reversing at both ends. Length of stroke is  $\frac{1}{4}$ " to  $2 \, 1/4$ ", adjustable at both ends. The second motion is a cam-driven constant-speed, quick-reversal reciprocating motion, adjustable from 1.64" to  $\frac{1}{8}$ ".

A special tracer, designated as "Type I", has been developed for measuring roughness inside holes as small as ½" diameter. A modification for even smaller holes can also be furnished on special order. The Type I tracer is also useful for measuring the roughness of gear teeth and other difficult-to-reach surfaces. The close spacing of pilot skids of this tracer makes it desirable to use the Mototrace described above for most applications.

A special Profilometer, with a one microinch scale, can now be furnished when required. The most sensitive scale on the standard Type P Profilometer is three microinches. On especially fine work such as gages, etc., greater sensitivity is required. This special model incorporates an additional point on the range switch, giving three times the sensitivity of the standard model. Except for this modification it is identical in size and appearance with other Profilometers.

#### Makes Springs in a Jiffy

The problem of providing special springs for special jobs is solved quickly without the use of a lathe, by a line of universal hand spring winders developed by The John Blaner Co., Corner Meek and Elm Sts., Sharon, Pa.

In use, the winders are mounted in a bench vise as shown. A mandrel of the required size (drill rod) is inserted and the top knurled head screw tightened to put tension on mandrel. The spring wire is fed between the two brass washers and attached to crank handle. The nut securing the brass washers is tightened to put tension on the spring wire. Turning the crank handle, the square shaft is adjusted for pitch. Moving square shaft in towards



## KIPParGRINDER

Kipp Air Tools give you the highest speeds, lowest prices, and are proving indispensable in tool room and production departments. Grinders sell from \$9,75 to \$58.75, Chippers and Filers \$19,75. The BB Grinder illustrated is only \$25. Try one of these handy, fast tools in your own tool room. The FREE trial offer permits any concern with a satisfactory credit rating to try out any Kipp Air Tool for ten days. New catalog gives details.

10 DAY FREE TRIAL NO OBLIGATIONS

Send Kipp Air Grinder



- ☐ Send Kipp Air Grinder Model BB on your 10 day Free Trial Offer!
- Send the new Kipp Air Tool Catalog!

Name

Company.

MADISON-KIPP CORPORATION

## GRANDAHL Oil Dispensing HAND PUMP

For clean, efficient handling of cutting oils, lubricating oils, alcohol, kerosene, and cleaning liquids.

Connecticut

Sturdy construction insures years of service. Capacity — Six strokes per gallon. Fits any standard size oil drum. Recommended for machine shops and factories. Price \$4.00 f. o. b. Hartford.

Prompt delivery-Order Today

Grandahi Tool & Machine Co. 1200 Park St. Hartlord, Conn. winder will give a close spring—outwards will wind a compression spring of the required pitch.



Five sizes of winders are available. Mandrel capacity of the No. 1 is from 0 to ½" diameter, handling wire from the finest gauges up to No. 19 (.0359"). Pitch can be adjusted from 0 to ¼".

The No. 4 winder is intended for general factory use, taking mandrels up to 1½" in diameter, and wire up to No. 3 gauge (229") with pitch adjustments up to 1".

#### Lee Chip Breaker Grinder

A special machine for the safe and rapid grinding of chip breakers on carbide tools is announced by K. O. Lee & Son Co. Aberdeen, S. D.

The universal fixture is simple, rigid and quickly set to grind the chip breaker to exact requirements.

Three protactor scales assure accuracy in setting of the tool for side and back rake.

Provision is furnished for supplying coolant to the work.

A vertical feed hand wheel, graduated in thousandths, gives close control.

Power is supplied by a ¼ h. p., 3450 r.p.m., single phase, 60/50 cycle, 110 volt ball bearing, dust proof motor. Motors can be supplied for other electrical characteristics at a slight extra charge.

#### MOORE'S



#### SMALL SET SCREWS

Headless to ½-13-Square Heads to ¾-16 and Dardelet

PIPE PLUGS: 1/8" and 1/4" Headless, Square Heads and Hollow Heads.

GEORGE W. MOORE 44 Farnsworth St., Boston, Mass.

For 60 Years Mfrs. of Quality Screws

## HALCO UNIVERSAL HEAD

FOR HIGH SPEED
MILLING DRILLING, BORING S LANGLE

PRICE \$195.00

With 10 Speed Back Gear \$47.50 Extra

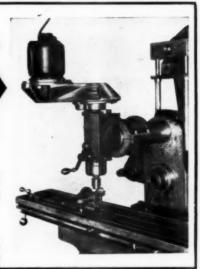
Sold direct, factory to you, or your nearest dealer. Many machines in use. Tried and tested in machine plants for 1-1/2 years. Each head is unconditionally guaranteed for six months.

Write for folder giving details or order now for quick delivery.

HALCO PRODUCTS CO.

14238 Birwood Ave...

Detroit, Michigan



### FATIGUE CUTS GRINDER RATES

The Defense Program and expanding industries demand higher production rates.

Elimination of operator fatigue is one of the first steps in raising output. When a grinder operator has to hammer, pull or pry parts loose from a magnetic chuck repeatedly, he tires, unnecessarily and wastes valuable time. Tired operators cannot hold high production rates and there's constant danger of slips and mistakes. More than that, precision work may be distorted or damaged, and the chuck face may be marred.

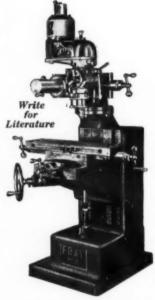
NEU-T-ROL releases the work promptly every time and demagnetizes it. Useful on small chucks, it is essential on heavy work.

ELECTRO-MATIC PRODUCTS CO.
4036 N. KOLMAR AVE., CHICAGO, ILLINOIS



There's a NEU-T-ROL for every size of magnetic chuck. Leading manufacturers will now supply NEU-T-ROL built into your new grinding equipment IF YOU SPECIFY IT. Or you can install it easily on equipment already in service. Write for full details.

# ONE WORK SET-UP AND THIS MACHINE WILL DO THE REST



"ALL ANGLE"
MILLING MACHINES AND
MILLING ATTACHMENTS.

MANUFACTURED BY

FRAY
MACHINE TOOL CO.
GLENDALE, CALIFORNIA.

U. S. A.



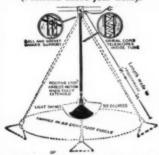
Motors can be supplied for other electrical characteristics at a slight extra charge.

#### From Behind the Bars

One of the most unusual inquiries ever received by McKenna Metals Company, has just come from an inmate of a large Eastern state prison. He requested a copy of Kennametal Catalog No. 3, which he had seen advertised.

Since Kennametal is a hard carbide tool material, particularly useful for cutting hardened steel such as used in prison bars, it might be assumed that this particular prospect hoped to use Kennametal to cut his way to freedom. However, the difficulty of preparing a satisfactory tool set-up, together with the fact that his letter passed the censor, indicated that he was interested only in improving the efficiency of the prison machine shop.

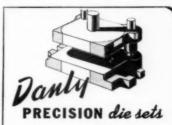
Light—Universal Movable Stays Put best for machine shop and drafting room and avoid glare or head strain. (Fastened above your work).



Push it up, pull it down, swing it out, swing it around, it stays put.

Write for Literature.

J. Zabora Machine & Gear Co.



Danly Machine Specialties, Inc. 2122 S. 52nd Ave.,

Chicago, Illinois Milwaukee, Wis. Long Island City,N.Y. Dayton, Ohio Detroit, Michigan Rochester, N. Y. Cleveland, Ohio

Philadelphia, Penn.
DUCOMMUN
Metals & Supply Co.
Los Angeles, Calif.
San Francisco, Calif.

DANLY SERVICE

9 Danly Branch Stocks Provide 24-Hour Service for 95% of All Metal Fabricating Plants.

Commercial Sets Special Sets

DANLY DIEMAKERS' SUPPLIES



STURDY BUILT

for Long, Hard Service

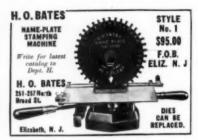
A complete line— 6\* to 12\*; Bench and Pedestal types; heavy duty; ballbearing; Price range \$19.50 (at left) to \$186.60 (at right) 1-YR. GUARANTEE

Write for Bulletin 77

BALDOR ELECTRIC COMPANY 4368 Duncan Ave., St. Louis, Mo.

BALDOR
BALL
BEARING GRINDERS





The M-B "Utility" Pneumatic Grinder, Model U .- T. R.



A WORTHY COMPANION TO OUR FAMOUS "SUPER SPEED" MODEL S. S. - S. R.

SPECIAL GREASE SEALED BEARINGS NO LUBRICATION REQUIRED.

AN ABUNDANCE OF POWER. OTHER MODELS, ALSO AIR LINE FILTERS AND AUTOMATIC AIR LINE LUBRICATORS.

Write for details.

#### M-B PRODUCTS

130 E. LARNED ST. DETROIT, MICH. Expert Office: 44 Whitehall St. New York, N. Y., U. S. A.

#### Balancing and Metal-Turning Methods

The current release of Gisholt performance data sheets includes case studies in metal-turning using automatic and turret lathes, and a typical example of static-dynamic balancing on a Dynetric balancing machine.

The balancing data covers the proce-dure followed by a manufacturer of ventilating fans in order to locate, measure and correct unbalance in them. Detailed description of the methods employed for each step is included in the data presented.

The metal-turning installation stories deal with actual machining procedures followed by manufacturers of automobiles, stokers, and portable compressors using Gisholt turret lathes and automatic lathes. Actual tooling layouts are clearly illustrated for each job. Operation sequences, feeds, speeds and machining times are also given.

This information is contained in performance data sheets Nos. 54 to 57, available from Gisholt Machine Co., 1185 East Washington Ave., Madison, Wis.

#### **KEYSEATERS** BURR



Mill keyways in the run or on the ends of shafting already erected \_ save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON 429 Kent Ave., Brooklyn, N. Y.



MARK

Offset Type

### NTINUOUS

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

Plain Type

AUTO MOULDING & MFG. CO.

2326 S. CANAL ST CHICAGO

SPECIFICATIONS: Open Width %" to 6"
Gage Material .040 to .125
Pin Diameter .101 to %
Lengths to 120"

THREE-FOURTHS OFFSET

#### Hammond Offers Polishing Lathe

A new addition to the Hammond of Kalamazoo line of Rite-Speed polishing and buffing lathes is the model 10-ROH shown.

It has an "overhanging" spindle, the front section overhanging 12-½" from lower front of base and is especially desirable on large bulky pieces.



Standard Equipment includes spindle lock for holding spindle when changing wheels; combination switch and brake which shuts off motor and instantly stops the revolving spindle; automatic motor starter; up to 10 h.p. motors with multi-v belt drive mounted inside the base.

Manufacturers are the Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich.

#### Production Sensitive Bench Drills

The Production Machine Co., Greenfield, Mass., announce a new streamline, high speed, sensitive bench drills. It is the latest addition to the half-century old established line of Reed drills.

The No. 25 is new in design, strong and simple. It is a production tool for accurate work; an all-purpose machine, capable of unusual speed, and adaptable to a wide variety of drilling operations. The drive is completely enclosed, and the only exposed moving part is the chuck and drill itself.



## USE SHOP PHONES without Shouting

Don't shout to make yourself heard above shop noise. Just install a Burgess Acousti-Booth and talk easily in the "Zone of Quiet" within the booth.

#### Acoustic Booth Shuts Out Noise

This remarkable doorless phone booth has a patented acoustic lining that blots up factory noise. Quiet inside, yet it has no door.

Open construction makes this booth easy to keep clean. Always well ventilated. Used in hundreds of plants.



Send coupon for details of the amazing new Burgess Acousti-Booth.

#### Mail Coupon for Free Booklet

| Burgess Battery Company, Acoustic Division<br>Dept. HM, 500 W. Huron StChicago  |  |
|---|--|
| Please send Free booklet describing Burgess<br>Doorless Acousti-Booth and how it makes tele-<br>phoning easy in noisy places. |  |

Name ...

Firm Name

Street-Cit

## BURGESS ACOUSTI-BOOTH

### A Versatile

TOOL ROOM FURNACE



As handy as a work bench, this new Despatch tool room furnace is ideal for small tools, dies, etc.

Sturdy construction . . . takes up little space . . . yet ample size for quantities of small objects . . . a practical furnace which meets a long-felt need.

NEW BULLETIN

## DESPATCH

COMPANY



### SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table

swivels and locks in any position. Can be varied 151/2" by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

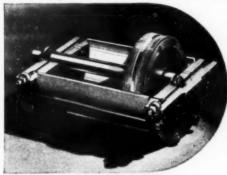
Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO. 112 Webster St., Dayton, Ohio The variable speed drive provides an infinite spindle speed range of from 2,000 to 10,000 r.p.m., instantly adjustable by the turning of a handwheel, and an indicator shows the running speed at all times.



Capacity-center-spindle to column is 7". Max. distance-chuck nose to table is 6-3/16". Range adjustment of sliding head is 3". Travel of spindle with depth stop, 3". Travel of spindle without depth stop, 3-34". Working surface of table, 11" x 11". Motor, ½ h.p., 110 volt, 1 phase, 60 cycle 3450 r.p.m., G. E. Co. Drill sizes, No. 70 to 1/4". Spindle dia.-least, 7/16". Spindle sleeve diameter, 2-1/8". Spindle quill diameter, 1-%". Spindle material. Rytenn A.A. Chuck-nose range. 6". Chuck capacity-Jacobs' No. 7-1A. 0 to 1/4". Spindle bearings-2 sealed precision ball bearings. Spindle pulley is of floating design and provided with 2 sealed, precision ball bearings. Height overall, 27". Bench space, 15" x 32-1/4". Weight with motor-195 lbs.

# adjustable "cushioned" air cylinder strokes



CUSHIONED AIR CYLINDER

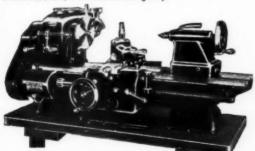
The action of the cushioned part of an air cylinder stroke depends on variables that are, at best, difficult to determine. This condition can be offset in part by having this cushion action adjustable. Cushion adjusting screws operate to "slow" or increase the speed of the cushion action.

Furnished as standard equipment on T-J Cushioned Air Cylinders, these screws may be readily adjusted and locked in position on the job. Write for catalog 36-A to the Tomkins-Johnson Co., 605 N. Mechanic St., Jackson, Michigan.

# this is a TOMKINS-JOHNSON product

### CUT TURNING COSTS!

Make your initial investment do more and last longer. Use Clausing Lathes for production, maintenance, in your tool room, for every light turning requirement. Equipped with Precision TIMKEN Bearings, their long precision life and low first cost make them pay good dividends wherever installed. If you are interested in a lathe, write for our new catalog today?



Four different models, each in three bed lengths. Standard and quick change types. \$150. to \$266.

See partial dealer list at right. Write for name of dealer nearer you.

CLAUSING MANUFACTURING CO.
433 Keota St., Ottumwa, lowa

Representative Distributors.
Atlanta, Ga., American Machinery Co.
Boston, Mass., Chandler & Farquhar,
Chicago, Ill.

Loop, Samuel Harris & Co.
North Side, Max A. R. Matthews Co.
North Side, Max A. R. Matthews Co.
West Side, Modern Machinery Sales
Cleveland Ohio, W. M. Pattison
Detroit, Mich., James W. George
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Kansas City, Mo.,
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Oakland, Cal., Della Equip. Agency
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Export: E. D. Allmendinger
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17 H., VonHamm Young Co.
London, Eng., Broadway Engineering
Toronto, Can., H. W. Petric Co.
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Victoria, Can., Whitsker & Revercomb

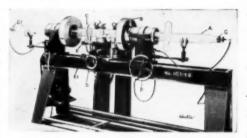
#### Eisler Glass Working Lathe

The Eisler Engineering Co., 762 South 13th St., Newark, N. J., has developed a horizontal butt sealing and general glass working lathe, No. 103-XB.

This type of machine is employed extensively for the production of large electronic tubes where metal and glass have to be sealed together. The machine will take tubing up to 6" in diameter and can be supplied

for larger sizes. A great many operations can be performed on this machine, some of which are:—1. Flare making. 2. Stem making. 3. Butt sealing. 4. "T" sealing. 5. Glass piercing. 6. Sealing metal to glass. 7. Drawing and shaping of glass.

Butt sealing is done by a series of flames, of a circular shape, using air and gas or at times oxygen and hydro-



gen, depending on the nature of the glass. Machine is equipped to work hard and soft glass and can be supplied in many types and sizes, either horizontal or vertical. A 1/3 h. p. motor is required. The swing over bed can be from 12" to 36". The bed can be had in 4—6—8—10 or 12 ft. lengths.



Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact easy to use—dependable.

Send for details-5-day FREE TRIAL OFFER!

Luma Electric Equipment Co. Dept. H-Main P. O. Bex 132, Toledo, Ohio



Built for hard, tough work — die canparce with one not lose alignpunch and one ment with

\$37.00 punch — all parts interchangeable.

Capacity —
1/2" holes through
3/16" steel; 13/32"
through 1/4" steel.
Can also be made for
holes up to 7/8" in
thinner metal. Stock
punches and dies available from 1/16 to
1/2" by 64ths. Weight,
70 lbs.

T. H. Lewthwaite Machine Co.

(Est. 1890) 311 E. 47th St. NEW YORK

#### Wrigraph Industro Drafter

A new, completely adjustable ball - bearing drafting machine for drawings up to 24" x 36" is offered by L. G. Wright, Inc., 5209 Euclid Ave., Cleveland, under the trade name of Wrigraph Industro Drafter.

It is a precision instrument which can be clamped to any drawing board up to 2" thick and 36" wide. Extension clamps are available for mounting on wider drawing boards. A hinged mounting, permits raising.

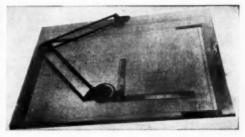
mounting, permits raising. clear of the board. A leveling screw adjusts to the plane of the board.

Eccentric adjustments provide for calibration and control of accuracy.

The arms are of specially rolled channel steel, giving extreme rigidity. All steel parts are finished in black baked wrinkle enamel. Eight hardened ball-bearing assemblies are adjustable.

Protractor head is controlled with the left hand and a new design features a No-Set-Zero. A one-half degree vernier, equipped with a magnifier, provides for quick and accurate setting of all angles.

Standard transparent edge engine divided scales are available in all standard graduations. These unusual scales are designed in such a way that they touch the drawing paper at the front and rear edges only. A thin square



drawing edge on the scale makes it possible to use either pen or pencil.

### Leisure Time and Home Safety

When your men leave the plant at night, what assurance do you have that you will greet them in the morning? One large firm has compiled statistics which indicate that the greatest danger

# SIMPLEX VISES



We manufacture a complete line of Machinists', Combination Pipe, Drill Press & Milling Machine, Welders' and Production Vises.

Write for catalog "H" and name of your nearest dealer.

DESMOND-STEPHAN MFG. CO.

Urbana, Ohio

2-5

U.S.A.



McMAHON Adjustable Angle

FRANK McMAHON CO., 142 JUNE ST., DAYTON, O.

ana, Ohio

# Oil-Hole Drills Work Perfectly with Universal Collet Chucks...



Universal Collet Chucks grip shank or flutes of drills (plain or Oil-Hole), end mills, keyway cutters, etc. as strong as solid steel.

# UNIVERSAL Engineering Company Frankenmuth, Mich.

lurks not where they work, but on the highways where they walk or ride during leisure time. In a 10-year period, a total of 39 employees met death from occupational causes. In the same period, 112 employees were killed on the highways.

A few minutes spent discussing after work accidents is decidedly worth while a Management should be concerned with the safety of their employees after the "whistle blows" as well as while they are at work. It costs money to train employees and relief workers generally a are less efficient.

In connection with the subject of leisure time safety, the seriousness of the home accident problem must not be forgotten. Fatalities in the home increased 2 per cent last year over the experience for 1938—from 31,500 to 32,-000. When you realize approximately the same number of persons met death in their homes as were killed by automobiles, then you can well appreciate the need for drastic action.

Why not take immediate steps to impress your employees with the seriousness of the problem and to provide them with training which will tend to reduce the probability of injury or death?—(National Safety Council, Inc.)

#### Cone-Drive Worm Gear Sales Soar

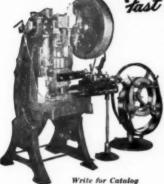
An increase of 400 percent in shipments of Cone-Drive worm gearing for the second quarter of 1940 as compared with the corresponding period of 1939, is reported by Cone Drive Division, Michigan Tool Co., Detroit.

The total represents an increase of roughly 200% over the first quarter of this year, which in turn had shown a gain of 94% over the first quarter of 1939. Totals do not include production of Cone-Drive gearing manufactured for sale or use in their own products by Michigan Tool Co, licensees.

Despite the large increase in production and shipments, unfilled orders for this type of gearing reached a new high, approximately three times total Cone-Drive sales for the entire year of 1939. A new plant is at the present time under construction which will double production capacity for this form of gearing.

# WITTEK ROLL FEEDS

FOR ANY MAKE AND SIZE OF PUNCH PRESS



WITTEK MFG. COMPANY
4305 W. 24th Pl. Chicago, U.S.A.

Fast Safe Accurate Automativ
Keep up with production schedules, yet keep costs down by
installing Wittek Automatic Roll Feeds—the feeds that bave made

automatic punch press operation practical on even comparatively short runs.

They can be installed on any make or size punch press without

They can be installed on any make or size punch press without alterations . . . will handle any coiled stock and feed from right to left, left to right, back to front or front to back in any length from 0° to 24° per press stroke at catalog speed or faster.

#### Improved Operating Principle

Improved, simplified method of operation insures rapid smooth, accurate feeding. Made in 3 types, Wittek feeds save dies, reduce scrap and cut maintenance costs to a minimum.

#### WITTEK ADJUSTABLE REEL STAND

6 types—a type for every job. Will handle any stock (metal, foil, paper, etc.) Wittek No. 3 (illustrated) has automatically expanding coil holders that center the coil and assure maximum production by eliminating looping, tangling and backlash of stock.



BENDING BRAKES

# WHITNEY-JENSEN

METAL TOOLS

No. 455 Angle Iron

# TOOLS YOU NEED TODAY



Capacity 2'x2'x¼'
Angle Iron or Smaller

Send for the latest Whitney-Jensen catalog showing over 80 useful sheet metal and metal working tools.

# FOOT

FOUR SIZES. Foot Presses available in four throat depths 7°, 10°, 18°, and 24°. Capacity 2° hole in 16 gauge iron, 100 holes per minute. Large flat work table available. Sturdy welded stand.





WHITNEY METAL TOOL COMPANY
115 FORBES ST., ROCKFORD, ILLINOIS

#### Gorton Boring Bar Sets

Rapid adjustment of tool (in and out) by screw graduated in thousandthspositive wedge locking of cutting tool — wide adjust-ment range — rugged bar, well supported cutting tool -low cost cutting tools, easily replaced - these are the highlights claimed for the Gorton - Wetmore Precision Boring Bars offered by George Gorton Machine Co., 1115 13th St., Racine, Wis.

All bars are furnished with high speed steel cutting tools and have No. 9 or No. 10 B & S taper shanks, fitting 81/2D and 9J Gorton super speed millers. respectively.

Boring bar sets are offered, as shown, consisting of four bars and one No. 6 Flynn micrometer boring



head, providing a complete range of tools for holes up to 2" in diameter.

# EFFICIENT-ECONOMICAL MANY EXCLUSIVE FEATURES





NEW ELECTRIC BRAZING AND WELDING TORCH-Quick release of carbons from holders by remote control (an need of interrupting work)...arc contact and break-ing arrangement is operated by thumb levers...com-plete with 10 feet of cable, plug-in connection, set of carbons. Use on all types of welders, A. C. or D. C.

ELECTRIC ARC WELDER-Ease in striking and maintaining a flexible and obedient arc makes it possible for even the most inexperienced operator to make a strong weld in less time... instant switching to various heats... three models, 150 to 250 amps.

PNEUMATIC UTILITY HAMMER-Ideal for cutting light gauge metals, weld-peening and flux-scaling, chipping on dies, molds, etc. Complete assortment of tools assures widest range of work.



MFG. CO.

ELGIN, ILLINOIS Send for Catalog Today

#### Model "F" Whiteprint Machine

A new fast-printing whiteprint machine in the medium price class has been developed by the Ozalid Corp., Johnson City, N. Y. It has been built to serve a vast market for which printers equipped with low pressure mercury vapor lamps are too small and high speed reproduction machines such as, arc lamp printers, are too expensive and too fast.

It comprises all the facilities necessary to produce finished dry - developed Ozalid whiteprints in less than two minutes. Yet, it is said to require less than 14 source feet of

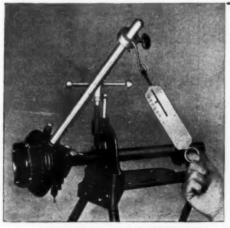
less than 14 square feet of floor space and use less than half as much electrical energy as other type printers of equal capacity.

A new type high pressure mercury vapor lamp with an output of 40 watts per inch and an active length of 46", gives printing speeds ranging up to



56" per minute with uniform light distribution. Lamp is guaranteed for 1,000 hours. Past performance indicates a possible life of 1500 to 2500 hours.

Original and sensitized materials are held in contact with a 41/4" diameter glass cylinder which revolves around



THE FINEST OF 1' TO 2' THREADERS

# A "TOLEDO" SIMPACT DOES PULL EASIER

This simple "torque-test" proves a "TOLEDO" SIMPACT requires less effort to operate.

Deep-throated high speed steel dies that can be resharpened many times — and it requires but one set to thread all sizes from 1° to 2°. Oil pockets drip oil on dies and pipe as thread is being cut. Handle is 24° long. Adjustable rear guide. Black crackle finish. Be assured of easy operation, long life and good threads —insist on a "TOLEDO" SIMPACT.

THE TOLEDO PIPE THREADING MACHINE CO.
TOLEDO, OHIO
NEW YORK OFFICE, 72 LAFAYETTE ST.

the stationary lamp. Cylinder, tracing and sensitized material revolve at the same rate of speed so there is no slippage, friction or static.

An adjustable light shade permits operator to vary exposure without chang-

ing rate of printing speed.

The Model "F" is driven by a resiliently-mounted split phase ¼h.p. motor. Developer is driven by motor through a specially designed 50-1 reduction gear and the printer through a friction disc type, variable speed transmission pro-

viding printing speeds between 4" and 56" per minute.

A special reactive type transformer equipped with condensers provides power factor correction to 87.5%. On terminal board of transformer are 12 taps which permits adjustments for line voltage variations between 200 - 240 volts.

#### Precision Tool Work Benches

A complete line of work benches for tool room use is offered by J. H. Rosberg Mfg. Co., 650 N. Kedzie Ave., Chicago, Ill.



Sturdy in construction and reasonable in price, these benches provide ample drawer capacity for small precision tools. Tops can be linoleum covered at a slight extra charge. Finishes can be in walnut, mahogany or oak.

Special work benches and special drawer arrangements will be made up to any required specifications.

# The HAMILTON MUEHLMATT Super Sensitive DRILLING

**MACHINES** 

The Muchimatt Drilling Machines solve the problem of drilling small holes in the smallest wire gauge sizes.

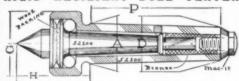
They are used extensively for drilling Diesel Injector Nozzles, Instrument and Jewelry work. Users report 100% savings on drill breakage.

Muchimett Drilling Machines are the answer to your drilling problems. Let us tell you more about them.

Send for complete details.

The Hamilton Tool Co.
B and Wayne Sts. Hamilton Ohio

### RIGID RESILIENT BULL CENTER



Rigid Tool Holder Co., 2,000 Witherell St., Detroit, Michigan

A disappointed buyer is slow in paying for his disappointment; while we have never yet, lost a dollar, on a purchase order; or a customer that we know of; and seldom send out a "Please remit". But we are real cranky, about good work, and good material. The best is none too good. Excellence in Designing and Manufacturing is Excellence in Advertising.

All Morse tapers carried in stock. Man-Power
Health in industry is a
more vital
c on sid eration because of the
present emphasis on armament.

Strong minds and strong bodies are needed to carry on the nation's defense measures.

At a recent conference, Dr. Victor G. Heiser explained that physical fitness of the Nazi war machine did not stop in the military ranks, but reached to the vital supply sources—the industrial machine.

Says Dr. Heiser, "It is the industrial machine to which America is looking for effective national defense. This machine is being called upon to build a defense which all

hope will make America secure from the ravages of war.

Dr. Heiser visited Germany about the time Hitler came into power. To his dismay, he found that the finest medical minds had been replaced in the Nazi regime with quacks, fadists and radicals—good Hitler supporters.

On a second visit, two years later, he was amazed to find that the quacks and crackpots had been kicked out

High Speed Production Needs

Production Needs

Grand Them on a Sellers drill taster last longer and produce

SELLIERS Operation to your entire plants

Brills ground on a Sellers drill taster last longer and produce

Drills ground on a Sellers drill taster last longer and produce

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William Sellers & Co., Incorporated PHILADELPHIA, PA. SELLERS

# Sellers

and reputable medical scientists were again directing Nazi health. The program was a simple one, calling for periodic physical checkups of every person engaged in rearmament. It took in all the men and women doing physical work in the factories building war equipment. Those found to be physically unfit were taken off the job until health could be restored—or if the disability was found to be permanent, until less arduous work could be found.

#### Simmons Micro-Speed Turret Screw Machine

A new No. 2 (11/4") turret screw machine is presented by Simmons Machine Tool Corp, 1725 Broadway, Albany, N. Y.

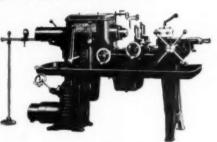
It features a Micro-Speed drive which is said to provide a thousand spindle speeds, enabling the operator to select immediately, the speed best suited for the spindle, dependent on the class of stock being machined.

This novel drive unit is built into the cabinet leg. A turn of the hand wheel provides an infinite range of spindle speeds. A

finite range of spindle speeds. A 3 h. p., motor is built-in and may be had for any required electrical characteristics.

The spindle is mounted on Timken precision tapered roller bearings. Bearings for sliding members are accurately hand scraped. Head is cast integral with bed for rigidity.

A long lever is provided on headstock for operating automatic chuck



and bar feed. Extra collets can be furnished for holding short length work of greater diameter than capacity through spindle. Each position of turret is controlled by independent adjustable stops. The hexagon turret holds six tools, with or without shanks. Bolt holes are provided for securing tools to faces of turret.

Cut-off is lever operated, although screw feed can be furnished. Two tool

# **TOOL ROOM BENCHES**

# For all Purposes

These benches are designed for precision tool work. They are now being used in some of the largest machine shops and plants in the country. Sturdily built throughout. Many drawers for keeping gauges, calipers and small parts. Priced so reasonable you cannot afford to be without one.

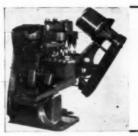
We also make benches to your specifications. We have been in business since 1885.

Please send for catalog and prices.



J. H. ROSBERG MFG.

CO.



# Globe

Machine Shown

Dial Type Machine With Hopper
—Automatic Facing and Tapping Machine Combined.

# Say "TAPPED"

Faster than it can be said, parts ARE TAP-PED, and other operations also completed, on GLOBE AUTOMATIC MACHINES.

Drilling, countersinking, facing, threading and other operations handled at high production. Send sample parts or blue prints for quotation.

Globe Tapping Machine Co. 751 Central Ave., Bridgeport, Conn.

posts of different heights are furnished. A geared oil pump provides lubricant through adjustable piping system to the work.

Swing over bed is 14"; over cross slide 6". Width of bed is 7". Automatic chuck capacity, round, is 1"; square, 11/16"; hexagon, %"; hole in plunger is 1-1/32". An oversize spindle can be supplied (at additional cost) to provide automatic chucking capacity for 1¼" round, with 1-5/32" hole in plunger and 1½ hole through spindle. Cross slide travel is 5"; hand longitudinal travel 12". Maximum distance, spindle to turret face is 18". Power feeds per revolution of spindle, .006", .010" and .018".

#### Foley DM-3 Die Maker

A universal precision sawing and filing machine, designed especially for die work is offered by Foley Mfg. Co., 28 Main St., N. E., Minneapolis, Minn. The makers emphasize that large starting holes are not required. Only the smallest hole through which saw or file passes is necessary. It is asserted that properly annealed die steels (high carbon, high chrome and high speed) regardless of toughness, can be sawed.

Any type from the coarsest to the finest high speed saw can be used without changing holding fixtures. Chucks are constructed to hold any blade, and no holes in blades are necessary. Standard and special files, from the finest needle file to the coarsest can be used without special holding fixtures.

Angular changes in table position can be made quickly without wrenches or tools. Ram can be tilted right or left to any desired angle up to 20°. In combination with the adjustable table, it permits cutting at combination angles.

Hold-down is combined with air nozzle and provides an air blast from internal air pump, keeping the work

The 6-3/8" throat permits sawing to

# New Model No. 40 ARMATURE LATHE

This NEW model Armature Lathe takes all armature and starter shafts. 26° bed, 16° cutting range, 6° swing. Take-up gibs and slide-ways machined to 60°. Compound swivels 360°.

Write today for complete specifications

Can be used for light metal and wood turning. \$27.50 complete in crate

ZOERMAN-CLARK MFG. CO., Inc., - Jackson, Mich.

# NOW... BOOST



#### Speed Up . . .

Grinding Sanding
Wire Brushing Drilling
Buffing Polishing
Filing

Now get faster, better work on your abrasive jobs. On hundreds of operations, STOW machines are helping clear the way to Bigger Output . . . to Bigger Profits.

Back of these paying results are STOW'S 6 years' experience as originators of Fexible Shafting. You are assured of the latest mechanical developments . . . precision accuracy . . . exceptional ruggedness. You get easy portability to any job . . . also a big selection of units and attachments that mean the right machine for either heavy-duty or light work. STOW quality and day-after-day service make your investment earn money year after year!

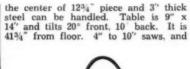


FREE-This complete STOW
Catalog contains valuable
new technical information
on uses and operation. Helps
you choose the right type of
machine—the right power
and speed for any material
or operation. Send postcard
for your copy NOW!

STOW MFG. CO., INC.

30 Shear St.,

Binghamton, New York





4" to 14" files and stones may be used. Power feed is 12" blade and feed finger. Stroke adjustment is 0 to 4". Five step pulley provides range of 85, 125, 175, 235 and 400 strokes per minute.

#### FACTORY TO YOU

# FLOATING HOLDERS



C. R. S. BUSHINGS - DRILL SIZES .22 ea. .28 ea. .34 ea. .40 ea. HALCO PRODUCTS 14231 BIRWOOD COMPANY DETROIT, MICH.

#### Continuous A.C. Arc Welders

Ergolyte welders, made by Ergolyte Mfg. Co., of 3644 Lawrence St., Philadelphia, offer new conveniences. All controls and sockets have been brought into full view on a sloped panel. Heats may be selected in gradual steps over a wide range, correctly proportioned to correspond to the commercial gauges of metal handled. Insulation is double spun glass.

A broken wave current is employed, produced by a special winding which is designed primarily for stability and

quiet operation.

It is claimed that the current required at no load never exceeds 50 watts. There are two models, No. 160 with a current range of 15-160 amperes and No. 250 with a current range of 15-250 amperes. Ergolyte welders operate on single phase or one phase of 2 or 3 phase current.

Steel Selection Chart

A new chart giving brands of Jessop tool steels recommended for various tools, dies and other applications, is offered by Jessop Steel Co., 603 Green St.,

Washington, Pa.

Known as the Jessop tool steel recommendation chart, it lists over 150 applications in alphabetical order, with the recommended tool steels indicated at the right of each application. It is easy to locate the tool or die under consideration from the alphabetical list of applications, then quickly determine what tool steel to use in the vertical columns at the right. Two different symbols are used to identify the tool steels recommended: — One indicates recommendations for average runs, the other for long runs.





# Wins The Pennant

GET ready for your big series by putting Sutton DIAMOND-GRIP collets on your screw machine line-up. Their surer grip under less tension eliminates the chance of slippage spoiling your score . . . And don't overlook the delivery power of Sutton Feed Fingers. They are perfect team-mates for Sutton DIAMOND-GRIP Collets.

### Sutton DIAMOND-GRIP Collets



SUTTON TOOL COMPANY 2895 W. GRAND BLVD. DETROIT, MICH. Accessories for Screw Machines

#### Hydraulic Fixture Punches 16 Holes

High production speed, flexibility o f individual punching units to permit rearrangement to accommodate possible changes in work, initial low cost-due to elimination of costly cam dies and constant air pressure method of piston return are features of a new series of self - contained hydraulic punching units announced by Welder Co., Progressive 3019 East Outer Drive, Detroit, Mich.

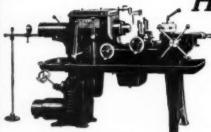
Constant air pressure is maintained in the piston return chamber. During punching stroke, this pressure is overcome by hydraulic pressure obtained through a hydraulic pump. Release of hydraulic pressure per-

mits air pressure to return the piston, thus eliminating spring return.



mounted on a radial type fixture designed to punch 16 holes simultaneously A group of the new units are shown,

# HERE IT IS!



Spindle mounted on Timken Precision Tapered Roller Bearings. Levers within immediate reach of operator. Head cast solid with bed, insuring rigidity.

Write to-day for complete details,

The new SIMMONS No. 2 (1¼") Turret Screw Machine offered to you with three distinct advantages:

- Low Cost
- High Precision
- Ouick Delivery

The SIMMONS Micro-Speed Drivé, equipped with push-button control and magnetic brake, offers a range of spindle speeds up to 1,500 RPM. The operator can select the speed bestsuited by a mere turn of a hand wheel.

# SIMMONS MACHINE TOOL CORP

1725 Broadway, Albany, N. Y.

Singer Bldg., New York City





# FOR CARBIDE TIPPED TOOLS THE ALL IN ONE TOOL GRINDER

Complete with --



TWO WORK TABLES

ONE 6"x1½" GRINDING WHEEL ONE 6"x½" FACE DIAMOND SET LAP

ONE PROTRACTOR

110 VOLT, 60 C. A. C. MOTOR 1750 R. P. M.

PRICE COMPLETE.....\$108

220 V. 60 C. 3 PHASE MOTOR \$5.00 extra
230 V. D. C. MOTOR \$10 extra, PEDESTAL IF DESIRED \$20 extra
DELIVERY FROM STOCK

T. C. M. MFG. CO.,

Harrison, N. J.



MODERN STREAMLINED

# GEARSHIFT DRIVE

PRICE

\$67.50 LESS BRACKET

#### SPECIFICATIONS:

All steel heat-treated gears run in oil bath. Hand wheel for rotation of machine spindle. Instant reversability with all speeds. Adaptable for flat or V-belts. Speeds on 3 speed forward and I reverse unit—175-300-600 forward, 160 reverse. Speeds for 4 speed forward unit—135-175-300-600. Direct Motor Driven Units available from 1 to 25 h. p.

Write Today for more information.

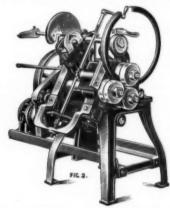
The Lima Electric Motor Co.
440 N. Main St. Lima, Ohio

in a harvester beater cover disk of 1/4" steel. The fixture is provided with a foot actuated work ejector. Automatic work locators are attached to the spring stripping plates which hold the part firmly in position during punching

After part is placed on die, opening of a three-way control valve initiates the punching operation by admitting oil, under pressure from hydraulic pump, to individual punching units. As all punches move in, locators hold work in position for punching. Immediately punching is completed, operator opens control valve permitting oil to by-pass back to reservoir in base. As stripping is completed, air in piston return chamber, under ordinary factory line pressure, moves piston back to starting position.

#### Bending Angle Iron Circles

An angle iron circular bending machine, No. 14, is offered by Excelsion



Tool & Machine Co., East St. Louis, Mo. It is designed to cut to length and bend 1¾" x ¼" angle iron to a true circle. Also ½" x 4" bar iron and 2" tee iron (and smaller) can be formed with the same rolls which are adjustable to various requirements. Special rolls for pipe, channel iron or any shape within the capacity of the machine can be furnished to order.

#### AMERICAN BONDED

PRE-FINISH





FOR MORE BEAUTIFUL PRODUCTS AT LOW COST

Cut costs! Eliminate plating, polishing and lacquering opera-tions with American Bonded Pre-finished Metals. Over fourteen different metals—in sheets, coils and round edge flat wire. To prove the economy of pre-finished metal in your own plant, let us provide—free of charge or obligation— enough of the pre-finished metal of your choice for a conclu-sive test. Write for complete details.



#### A COMPLETE LINE

CHROME ZINC NICKEL ZINC **BRASS ZINC** CHROME STEEL NICKEL STEEL

Corrugations.

**BRASS STEEL** CHROME BRASS NICKEL BRASS CHROME COPPER **NICKEL ALUMINUM** CHROME ALUMINUM Bright or Satin finishes Stripes, Crimpings,

AMERICAN NICKELOID CO. For World's Finest Pre-finished Motals

KIT" OF PRE-FINISHED METAL FOR FREE "TEST

# ANDERSON Improved



# **Balancing Ways**

Every shop handling rotating parts needs this simple, sturdy, dependable device for balancing, straightening and truing operations. Saves time and trouble and assures better work.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a prompt, sure indication of whether or not the work is in perfect balance.

Write NOW for full information.

| Swing  | Greatest<br>Distance<br>Between<br>Standards | Capacity in lbs.                 |
|--|--|----------------------------------|
| 20 in.<br>40 in.<br>60 in.<br>72 in.<br>96 in. | 20 in.<br>30 in.<br>30 in.<br>66 in.         | 1,000<br>2,000<br>2,000<br>5,000 |

ANDERSON BROS. MFG. CO., ROCKFORD. III. 1907 Kishwaukee St.

SEPTEMBER 1940

All three rolls are driven and small circles can be rolled by one pass with ends close together. Reversing the angles and passing them through twice, both ends will be true to the circle.

A friction clutch permits starting and stopping under pressure. Frames are of semi-steel. Rolls are of forged hardened tool steel, driven by heavy chain gears, 14:1 ratio. Shafts are 3" in diameter; rolls 7" x 2" face, operating at 15 r. p. m. or 25 lineal feet per minute. Power required, 3 h.p.

# Having difficulty holding tolerances?



- pensates for machine spindle misalignment, climinating over-sized or bellmouthed holes.
- · Helps produce unbelievable accuracy on both new and old equipment.
- Furnished with male or female taper. Straight, threaded or special shanks to fit any machine used for tapping or reaming.

V. M. ZIEGLER TOOL CO. Marantette & 12th Sta.,

Detroit, Mich.

#### Pilot Cylindrical Plug Gages

A definite advance in plug gaging is offered by Pratt & Whitney in the new Pilot principle. Instead of being difficult to start, it is asserted that this



new plug gage can be presented lightly at an angle and almost falls in by itself. A combination of a chamfer at the end and an annular groove near the end permits easy entry and the gage centralizes itself, lines up and enters without jamming. Even when the plug is a very close fit, it is claimed to slide in without difficulty-and large gages are said to work as easily as small ones.

The advantages of such gages are ob-



#### THERE'S A HILLIARD CLUTCH FOR EVERY JOB ...

THE HILLIARD OVER-RUNNING CLUTCH ... Four important functions: Automatic dual drive drive operation of any equipment with any type of prime movers . . . Automatic operation of 2-speed drive . . . . As a ratchet, permitting infinite adjustment . . . As an automatic back-stop. Write for booklet giving full information.

THE HILLIARD CORPORATION - 126 W. 4th St., Elmira, N. Y. Chicago Office, 201 North Wells St.

HILLIARD CLUTCHES • ELMIRA, N. Y.



# Get 2 for 1 with this new COMBINATION CENTER GRINDER

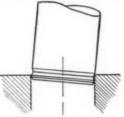
To change from a Center Grinder which dresses the angle accurately and assures accurate grinding on successive operations to a sturdy, accurate Drill Presssimply loosen one bolt, raise dresser up full height and swing out of way. Floor type, furnished in any length, complete with motor, diamond and grinding wheel. Four speed V-Belt drive to \$107.50 handle most any range of work. Write for Bulletin

Dalzen Tool & Mfg. Co., 511 Leib St., Detroit, Mich.

No. 10.

vious, in the hands of unskilled operators-or when the hole being gaged is difficult of access.

Another attractive feature of P&W



plug gages is the machine lapping which levels the surface hills and valleys and provides a large effective area of gaging surface to take the wear in every day use.

Pilot gages are produced by Pratt & Whitney Division Niles-Bement-Pond Co., West Hartford, Conn., under a direct license from the British originators. They are prepared to incorporate the Pilot principle in existing square end plug gages where desired.

#### MAKE SPRINGS

in a jiffy!

Patent No. 2052443

Write for your

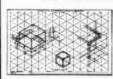
with Blaner Universal Hand SPRING

Here's a profitable tool room unit. Quickly makes hundreds of sizes of springs. Sturdy, depend-able . . . a real time and money-saver.

lilustrated is No. 4 Universal with adjusting shaft of 5% square. Takes wire up to 1/4 diam.

Circular. THE JOHN BLANER CO. Corner Meek & Elm, Sharon, Pa.

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EASY TO MAKE AND READ! One trial will make you another steady user of WADE'S ISOMETRIC blue lined paper. Shows all surfaces and interior to scale. Makes clear blueprints. Saves time daily in hundreds of plants.

In Pads with directions-**Buff Drawing** 51/2×81/2-100 sheets 81/4×11\_ 50 sheets No. 20 \$1.00 81/2×11\_ No. 22 1.00 25 sheets No. 24 1.00

INSTRUMENT CO.

No. 22-T No. 24-T 1422 E. 109th Street, Cleveland, Ohio.

Tracing Paper No. 20-T \$1.00

1.00

1.00

#### Wyco Concrete Vibrator

A new model, gasoline engine driven. wheelbarrow mounted concrete vibrator has been developed by Wyzenbeek & Staff. Inc., 836 West Hubbard St., Chicago. It features a simplified clutch mechanism and a rugged flexible shaft construction with a non-metallic inner liner. Power loss in the shaft is claimed to be low, permitting the use of four or five sections.

The vibrator head is of the unbalanced rotor type. It is a one-piece alloy steel casting, mounted on two Norma-Hoffman roller bearings with one ball thrust bearing.

Vibrators of this type are used to assist in settling the concrete properly. eliminating cavities and honeycombing, and assuring proper bond with the reinforcing bars.

#### Rubber Dies in Aircraft Work

Huge slabs of rubber weighing two tons each are reported to have helped step-up aircraft production at the Douglas plant.

The slabs are 13' long, 5' wide and 11" thick and were made by Goodyear. They are used in three 5000-ton presses in the making of metal stampings.

With this rubber mat process, a single die is used. The rubber fits into a steel container which descends on the press table. The metal is placed over



the die, and as pressure is exerted, the rubber conforms to the shape of the die and forces the sheet metal into the desired form. The rubber flattens out when pressure is applied until a spectator would think it could never return to its original shape,-but it always does.

An advantage of the process lies in the elimination of burrs and sharp edges, saving a lot of burnishing and buffing. Then there is a real saving in the matter of dies, for only one die has to be made, and it can be of wood instead of steel. To resist the cutting action of the dies, a rubber compound of great strength is required, with extreme toughness and lots of ability to stretch.

While the process is especially adapted to the aviation industry, where die costs have been extremely high due to limited production, it is believed the



Shut Off Expense Caused by Slippage You Save Money on Every Installation

NEW LOW PRICED PRODUCTION LINE SEE PART LIST Send for List\_On the Shelf

Increase

Dia. Face Price Dia. 2 "x21"—81.25 4 " 21"x21"—1.45 41" 3 "x31"—2.25 5 6 " 3 "x31"—2.55 6 " 3 "x31"—2.55 6 " 3 " x31"—2.55 6 " x31 Production

We supply Fractional Dia. and Face Pulleys.—From large casting stock. VACUUM CUP METAL PULLEY CO., INC. 12536 Grand River Ave., Detroit, Mich.

# What Do You Demand In a Good Hotel?

Do you like well-appointed, homelike rooms, comfortable beds, good food at reasonable prices, a safe place for your car?

Must your hotel be conveniently located to business, stores, theatres?



If those are the things you demand in a good hotel, you'll like Hotel Lafayette.

#### Rates

Single.......\$2.50 up Double...... 4.00 up Special rates for 4 or more.

Write for Folder J.

LAFAYETTE



# THE REID POWER-FEED SURFACE GRINDER INCORPORATES SEVERAL EXCLUSIVE FEATURES.

# Including:

- 1. Centralized Control.
- 2. Convenient Cross Feed Knock-Off.
- 3. Rapid Table Travel With Chain Drive.
- 4. Complete Dust Protection.
- 5. Improved Spindle Assembly.
- 6. Hydraulic Controlled Reverse Clutch.

Send For Circular

REID BROTHERS COMPANY, INC.

EST. 1900

Beverly

Massachusetts



# CHECK MICROMETERS with ULTRA-CHEX

Many plants are distributing their large orders among amaller shops. Don't risk rejections. Equip your shop with ULTRA-CHEX (accurate to 8 millionths) and regularly check every micrometer your men use.

Request Bulletin 135.



### NINE STANDARDS IN SET

.0625' - .100' - .125' - .200' -.250' - .300' - .500' - 1' - 2' Price with Optical Flat \$25.00 Price without Flat \$19.50

GEORGE SCHERR COMPANY, INC.



method may be used to some extent for automotive stampings.

The process is said to be particularly effective with light and flexible metals such as aluminum and its alloys. The Douglas Co., also uses the rubber stamping for shearing metals by sharpening the edge of the die. Light metals can be sheared clean and it is said that high test carbon steel can also be processed.

Blanking and forming operations are performed simultaneously and it is reported that Douglas Aircraft has licensed the process to a number of other manufacturers.

#### Drum Type Master Switch

A new drum type master switch providing 3-wire control for machine tools and other equipment is announced by Cutler-Hammer, Inc., Milwaukee, Wis.



It is claimed to afford functions equivalent to two and three button heavy duty push button stations and is offered for use where an operating lever is preferred.

Three types are available: — surface, cavity, and panel mounting—and two kinds of handles, standard and pistol grip. By removing a stop post, the drum may be converted from non-reversing to reversing.

Ratings of the new drum type master switch are for pilot circuits up to 600 volts A. C. and D. C., and details are given in bulletin 10260.

# KNU · KAM · KLAMPS

THE MOST NOTEWORTHY ADVANCE IN CLAMPING YET DEVISED TO DATE. HARDENED STEEL ROLLERS IN CONTACT WITH CAM SURFACE PERMITS ONE INCH ADJUSTMENT. TOGGLE LINKAGE ENABLES CLAMPING BAR TO BE SWUNG CLEAR OF THE WORK. USED FOR HOLDING PARTS IN MACHINES OF ALL TYPES, WILL NOT VIBRATE LOOSE, WITHSTANDS ABUSE AND HARD WEAR.

VAST IMPROVEMENT OVER STANDARD TOGGLE CLAMP IN
THAT PARTS VARYING IN THICKNESS ARE
CLAMPED WITHOUT NEED OF RE-SETTING
ADJUSTMENT NUTS, AND WEAR IS AUTOMATICALLY TAKEN UP BY CAM.

DESIGNED, PATENTED & MANUFACTURED BY SPECIALISTS IN TOGGLE ACTION TOOLS

**ELKHART** 

# KNU-VISE INCORPORATED

16841 HAMILTON AVE.

BRANCH OFFICES:— LONDON ENGLAND

- PHILADELPHIA, PA.

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INDIANA



# CHECK THESE FEATURES

### of the Nilson Automatic Metal and Wire Forming Machine

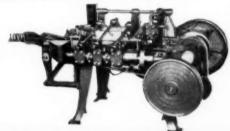
Open construction of press and forming tools.

Patented slide feed with an independent cam-operated wire gripping device.

Power operating wire feed is transmitted through a straight line.

The NILSON AUTOMATIC Metal and Wire Forming Machine meets Today's industrial requirements. Engineered with a 50-year back-ground of experience in designing and building metal forming machines, this S-3-F machine is setting new records in speed and uniformity of products.





# The A. H. NILSON Machine Co.

#### Varidrive-Syncrogear Units

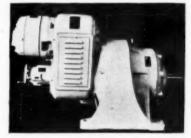
Providing more compact and smaller units, U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles, Cal. and 80-34th St., Brooklyn, N. Y., have added types VEV-GD and EV-GT to the Varidrive line. These are of the Varidrive speed design with the double reduction and triple reduction gears for low speed drives.

The new construction does not require a sub base for mounting as a unit and consequently is lighter and more compact.

Further modification of the old design permits mounting of the Varidrive case at any angle with respect to the gear case. If the unit is to be mounted where head room is low, the case may be placed on its side or at any convenient angle.

The pyramidal gear pedestal is characteristic of U. S. Syncrogear motors, providing a rigid mounting for the case and a sturdy motor capable of withstanding heavy torsional stress resulting from heavy loads at low speeds.

The tooth surfaces of gears are hardened to 55/65 Scleroscope, providing a high standard of surface hardness



which means longer life. The core or inner body of the pinions is extremely tough and of proper ductility for maximum resistance to fatigue from recurring shock stress.

### Rawlplug Wall Anchors

Among the innovations at Parkchester (Manhattan's largest apartment



Lost motion, false motion and unnecessary motion all cost money. Only a little at a time perhaps, but over the period of a year, the total would be impressive. Why not save this? Useless motion also represents a loss. Lifting heavy

Useless motion also represents a loss. Lifting heavy coils of wire wastes time and energy. Why not let NILSON save this too?

A foot lever is tripped, the quards removed, a coil of wire slid upon the carrier, the guards replaced and set screws tightened, an easy lift, and the counter-balancing weight does the rest, bringing the tilting section to a vertical position, ready to feed the wire into the machine.

Send today for Bulletin No. 51 and learn how you save in other ways too.

# The A. H. NILSON Machine Co.

development) is a new type of valveless loop-fed convection radiation, thermostatically controlled.

The enclosed radiators were attached to the rough brick walls by a newly

designed expansion anchor made by The Rawlplug Co., Inc., 98 Lafayette St., New York City.

This anchor is designed to expand with a true radial expansion, engaging the masonry more accurately than caulked lead. It is simply driven into a hole with a hammer.

It involves a combination of a circular sleeve with one continuous slot and a taper inside of the sleeve, exactly complementary to the taper on the outside of a threaded cone. Installed in one piece, it is driven with a hammer telescoping the anchor, locking it in the hole in the masonry. Final expansion of the anchor takes place with a few turns of the bolt firmly attaching the bracket to the wall.

#### **Electrical Coil Bobbins**

A new type of electric coil bobbin has been developed by Precision Paper Tube Co., 2033 Charleston St., Chicago, Ill., that enables manufacturers of small motors, relays, solenoids, reactors, photo electric devices and other electrically actuated equipment to use smaller and more efficient bobbin coils rather than the larger layer-wound coil, having insulating strips between winding layers.

The new bobbins are of Kraft or Fish



speedier · easier · better!

- Unlimited selection of spindle speeds, while running, at will—from a low of 65 r. p. m. to a high of 6300 r. p. m., (at a ratio of 13 to 1). Smooth-operating; no "jumps", no "steps."
- Equipped with Standard NEMA frame, completely enclosed single or two-speed Motor; hand or foot-operated Collet (or 3-jaw Universal Chuck); exclusive Automatic Brake. Lost time, due to slow stopping, completely eliminated?
- Write for descriptive Bulletin 400. State your problem. We provide engineering service for adapting our Speed Lathes to your special production needs.

Schauer Machine Company

paper, or a combination of both, depending on requirements. The paper is spirally wound on a steel die on automatic machines to form tubes of convenient length, which are cut into proper bobbin sizes. The flanges are of vulcanized fibre, die cut to exact size and shape and pressed over ends of tubes. Ends of the tubes are swaged. Impregnating the bobbins with a special lacquer increases the strength and forms a seal between tube and flange and improves electrical characteristics.

#### Drive Fittings and Accessories

A very complete line of pulleys, V - belts, flanged and crown face pulleys, variable pitch pulleys, flexible and sleeve couplings, pillow blocks, journal bearings, shaft collars and supports is illustrated and described in a



scribed in a n e w catalog No. 42 issued by Chicago Die Casting Mfg. Co., 2502 W. Monroe St.,



An interesting line of grinding mandrels is presented, along with saw, buffing and grinding mandrels.

Die cast flanges, hubs and hand wheels are included, together with grinding and motor attachments, universal joints, reducing and mitre gears, sanding discs and revolving display tables.

# GAS Torches-Forges Ovens-Heating Machines



EQUIPMENT for Clean Hardening—Annealing—Carburizing—Nitriding. Write

American Gas Furnace Company

#### Skilsaw Announces New Disc Sanders

Three new disc sanders are announced added by Skilsaw, Inc., 5035 Elston Ave., Chicago, Ill.

Model "SP" is a 2-speed heavy duty sander and polisher—especially developed for steady use in metal fabricating plants where there is need for a variety of sanding, polishing and buffing operations. When operating at a speed



of 4200 r.p.m. with a 7" disc, it provides a maximum of sanding efficiency.

At 1300 r.p.m., the tool is used with felt rubbing pads or lamb's wool polishing bonnets for rubbing down lacquered surfaces and other polishing operations. A simple gear shift facilitates changing from one speed to the other.

Eight heavy duty ball bearings, on all shafts permit maximum loads and with quiet operation and long life. Model "SP" is 18½" long and weighs 14-34

Model "H2" (illustrated) is a 2-speed heavy duty sander for real economy wherever sanding work is constant in nature. A 9" disc is first used at 2700 r.p.m. When outer edge of disc becomes worn, it is re-sized to 7" diameter using a special disc trimmer provided. Mounted on the alternate 7" pad, it is used at a speed of 4200 r.p.m. Eight heavy duty ball bearings, on all shafts make for efficiency and longer life. Model "H2" is 19½" long and weighs 16 lbs.

Model "SL" is an extra heavy power unit for a wide variety of heavy duty sanding, grinding and surfacing. It operates at a no-load speed of 5000 r.p m. which is the speed recommended by grinding wheel manufacturers for 6" wheels to insure fastest production and

longest life.

# Now you have to SPLIT THE SPLIT HAIR

 With demands for precision in the 1940 contracts more exacting than ever before, your need for Johansson Gage Blocks is greater than ever before. They are unexcelled as a means for achieving — and maintaining — the highest precision. MOST JOHANSSON BLOCKS ARE AVAILABLE CHROME-PLATED

Write now for the free catalog listing all sets, prices and precision accessories. Individual blocks as low as \$3.50. You will find the blocks listed that will help you meet the new demand.

Complete sets in case begin at \$23.

| JOHANSSON DIVISION<br>FORD MOTOR COMPANY | Please send me free Catalog No. 15. |
|--|-------------------------------------|
| Dept. C                                  | Address                             |
| Dearborn, Michigan                       | CityState                           |

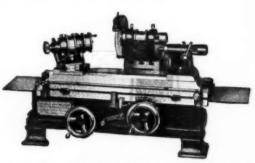
#### Crystal Lake Universal Grinder

A sturdy universal bench grinder, for production, tool and experimental work is offered by Crystal Lake Machine Works, Crystal Lake III.

It handles a wide range of work including three angles in one setting for circular tools; internal and external for dies, gauges, square, hex, spline, punch, cam grinding; index for accurate grinding; precision grinding of screws.

rollers, cam shafts, parts of cameras and projectors, airplane engine parts, instruments, etc.; cutters, form tools, concentric ground reamers, etc.

Platen swings through a complete graduated circle, clamp loosened or tightened from either side. Two speeds are available for platen feed for wheel



—.037" and .300" per turn of hand wheel —micrometer stop on platen for positive sizing —.0001" direct reading on dial. 6" x %" wheels with %" hole.

Table is 27" long—capacity 8" x 10"; triple geared, travels ½" to one turn of hand wheel. Platen is of Vee and flat design for sustained alignment of

# CUT COSTS-INCREASE PRODUCTION

with

### DETROIT POWER SCREWDRIVERS

These MAGAZINE FEED POWER SCREWDRIVERS DRIVE SCREWS FASTER THAN EVER BEFORE.

Machine screws, wood screws, brass screws, aluminum screws, self-tapping screws, drive screws, cap screws, special screws, washer assembled screws.

Standard heads, special heads, Phillips heads, slotless heads.



which provides handling a wide range of screw sizes. From a No. 2-56 screw to a 5/8 cap screw.

#### UNIFORM TENSION-NO MARRING OF HEADS

No stripping of threads.

DRIVING TIME: 1 to 2 seconds per screw.

SEND SAMPLES FOR PRODUCTION ESTIMATES

DETROIT POWER SCREWDRIVER CO. 5363 ROHNS AVENUE :: DETROIT, MICH.



Model B

ADJUSTABLE While Running!

#### The Precision Universal Tool Head

THE ONLY TOOL HEAD THAT IS ADJUSTABLE WITHOUT STOPPING THE MACHINE.

A truly universal Tool Head that has rendered all types of the once popular wrench-adjusted "offset boring tool" entirely obsolete, as it brings all adjustments under absolute micrometric control of the operator at all times and at all speeds without stopping tool or machine. By a mere turn of the wrist the culting tool is instantly adjusted to a fraction of a thousandth for boring, or fed continuously across or into the work for

facing or recessing.

It is not only the fastest and most accurate boring tool in existence, but is far more than that as it also faces, counterbores, turns outside diameters of hubs and bosses, recesses, mills flat surfaces and slots, undercuts, back-faces, trepans and does countless "head-ache" jobs that the antiquated wrench-adjusted boring tool cannot do because it cannot be adjusted while running.

The eight operation job shown here was performed at one setting in one hour, 12 minutes.

No special tools or set-ups required. Let us solve your difficult problems. Bulleting.

THE PRECISION TOOL COMPANY P. O. BOX 155, BROOKLYN, NEW YORK

Cables: PRETOOL-NEW YORK

Tel. MAin 4 - 1064

Write for

Absolutely Different

Eliminate Fume and Dust Hazards

You can give your workmen full protection against fumes and dust with the modern Berg equipment. Constructed entirely of metal, Berg equipment is sturdy yet weighs no more than 55 lbs. It can be moved quickly and easily-covers a 7 ft. radius. Low in first cost and in upkeep.

Send TODAY for full details.

C. F. BERG & CO. 72-74 Dedham St., Boston, Mass.



head and tailstock. Sensitive adjustment of platen is provided for tapers.

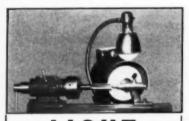
Tailstock spindle is hard-ground and lapped for accurate grinding on cen-

ters.

Headstock is swivel graduated to full circle, hard-ground and lapped. ½" maximum collet capacity—9/16" clear hole through spindle. Four changes of work speed are provided. Swings 4" over platen.

Internal grinding attachment, operating at 17,500 r.p.m., and a spline grinding attachment running at 5600

r.p.m., are available.



# THE LIGHT FOR MACHINES OF ALL TYPES

Grinding is more accurate on K. O. Lee's new cutter grinder, equipped with a VIMCO-LIGHT. A flexible intense light focuses locally on any spot from any angle. Vimco's 20 years of general machine lighting will increase your machine efficiency too.

Write for complete details.

# VIMCOLIGHT

VIMCO MANUFACTURING CO.

### Covel Tap Grinding Attachment

A wide variety of sizes and styles of taps can be chamfer sharpened on the new No. 2 tap grinding attachment offered by Covel Mfg. Co., Benton Harbor, Mich.



It is easily mounted on any grinding machine equipped with a grinding wheel of 1½" face or less, longitudinal and transverse adjustments similar to a universal cutter and tool grinder with a flat table 4½" to 6½" wide.

a flat table 4½ to 6½ wide. Set up is simple. No cams, gears or collets are required to hold the taps, or to obtain the proper eccentric relief.

Small taps from No. 6 to 6½" are held in an accurate 3-jaw chuck, while larger taps are held on centers during the grinding operation. A female center is provided for the small taps requiring it. Capacity embraces No. 6 to 2" diameter taps, any pitch, from 1" to 12" long—2, 3 or 4 flutes, right or left hand.



Why Not Buy The Original Electric Etcher?

# MARK IRON AND STEEL THE ETCHOGRAPH WAY

New ELKONITE TIP pencil. New Baby Grand Model at a lower price. 2,000 in use

WILLIAM BREWSTER & CO., INC. 42 Church St., New York, N. Y.

#### The New Vernon Hand Miller

A new addition to the Vernon line of precision milling machines is the Vernon No. 0 hand miller for high speed milling of smaller parts. With hand lever operated rack and pinion feed,



the Vernon No. 0 is a precision machine tool providing the accuracy and sturdiness required for the modern production department.

Two standard speed ranges are available:—100 to 1000 r.p.m., or 150 to 1500 r.p.m. The fully enclosed variable drive operating in these speed ranges provides correct spindle speeds for a broad range of jobs. The ground spindle of heat-treated steel is mounted on Timken tapered roller bearings. The taper in the spindles is No. 9 B. & S. Power is provided by a ½ h. p., 1750 r.p.m. 60 cycle motor. For continuous high speed operation a ¾ h. p. motor is recommended. Net weight is approximately 650 pounds and the overall weight is 58". It is made by the Machinery Mfg. Co., 3636 Irving St., Vernon, Los Angeles, Cal.

# DON'T LET MISFIT SOCKET SCREWS WRECK YOUR PRODUCTION SCHEDULES

### SPECIFY



#### SOCKET SCREWS

and be sure of perfect fit every time.

There's no chance of lost production time, through fussing and fiddling around with misfit, poorly machined socket screws, when "Unbrakos" are used. The uniform accuracy of "Unbrako" Socket Screws, that makes every one a perfect fit, is definitely assured by our rigidly controlled methods of machining and inspection.

Furthermore, when you order "Unbrako" you get screws made of properly heat treated alloy steel...the result of many years' experimentation and practical service in almost every line of industry.

Next time, be sure .. specify "Unbrako". In the meantime, get a copy of our 'Unbrako Catalog.



Fig. 232
"UNBRAKO"
Hollow Set Screw



Fig. 1434 Knurled
"UNBRAKO" Socket
Head Cap Screw.
Pats. Pending.

### STANDARD PRESSED STEEL CO. JENKINTOWN, PENNA.

Boston Detroit Indianapolis Bex 559

Chicago St. Louis San Francisco

# POPULAR TOOL ROOM STORAGE UNITS

No. 30 TOOL CABINET

Size:
22°Wx15¾°D
and 34° high.
Protection for
your tools.
Heavy gauge
welded construction, a
djustable
shelves. Top
bottom and
shelves are
formed trays.
Doors have
device for
Padlock.



Prices F. O. B. Cleveland, Ohio
No. 2050 Small Parts Cabinet



Size: 17\*Wx8%\* H x 11%\* D. Handy for use on bench, for storage of small parts, bolts, nuts, washers, etc. Contains 3 drawers with a total of 60 various size compartments. Each compartment has label holder and cove bottoms.

Large Variety Styles and Sizes. Shelving, Bins, Boxes, Lockers, Etc.

THE INTERIOR STEEL EQUIPMENT CO.

2352 East 69th Street

Cleveland, - - Ohio

#### Portable Rectifier For Test Bench

The Model SP-20 rectifier, manufactured by Mellaphone Corp., Rochester, N. Y. is designed especially to provide d. c. from an a. c. source for testing purposes. The output voltage may be adjusted by means of knobs on the



front panel in steps of 32, 110, 115, 120, 210, 225, 240 volts. Output voltage is indicated on panel voltmeter.

Maximum current capacity is given as 30 amperes at 32 volts d. c. and 20 amperes at other voltages. This provides ample power for testing farm equipment as well as 110 or 220 volt d. c. refrigeration equipment, business machines, electro-magnetic devices etc.

Two mercury vapor tubes are used to obtain full wave rectification of the single phase a. c. line. Output voltage remains practically constant from no load to 25% overload.

The Model SP-20 can be supplied either with or without a filter choke. For ordinary purposes filtering is not necessary. However, where it is desired to duplicate d.c. line conditions, the filter should be used.

A Hinged cover provides easy access to the tubes and terminal strip. Wheels can be installed for extreme portability. Size 12" x 12" x 21" without filter; 12" x 18" x 21" with filter.

A BIG LABOR SAVING PRODUCTION MACHINE

TYPE S POLISHER & SURFACER

Combining a centerless feed polishing machine—a vertical or horizontal belt grinder—surfacer or polisher, and an internal grinder or polisher, the Type S is remarkably versatile. Suitable for metal, rubber, fibre, wood or anything that can be ground or polished, it has no equal for cylindrical polishing or straight line finishing on flat work. Can be changed for hand feed and from vertical to horizontal in few seconds. Cylindrical work ¼\* to 1\* in diameter may be fed automatically without centering or chucking.

Other Types—Also Reed High Speed Sensitive Drills.

Send TODAY for bulletin giving full details.



PRODUCTION MACHINE CO.
GREENFIELD, MASSACHUSETTS

An Economical Live Ball and Roller Bearing Center

FOR LATHES, HAND SCREW MACHINES, GRINDERS and MILLS

A lower first cost is the only cost. A ten day free trial-No obligation. Four big features are:

1. Simplicity and sturdiness adapt it to heavy duty.

Sufficient bearings for radial, thrust and alignment loads, result, 50% more radial load than average live center.

3. Large spindle, small head, short overhang spell rigidity -result, no chatter.

4. Special oil seal retains lubricant-resists foreign matter.

A folder giving prices and complete details will be mailed to you upon request.

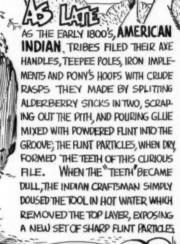
MOTOR TOOL MANUFACTURING CO.

12281 TURNER AVE.

640

DETROIT, MICHIGAN

# Mechanics Through the Ages



KOBABLY THE EARLIEST

EXAMPLES OF MASS PRODUCTION &
WERE THE HORSESHOPS MADE BY

WERE THE HORSESHOES MADE BY THE EARLY ROMANS. MARKINGS AND SIGNS ON ANCIENT HORSESHOES, DUG UP FROM RUINS INDICATE THEY WERE TURNED OUT IN QUANTITIES IN FACIORIES

ECAUSE THEY MADE IMPLEMENTS OF WAR,
THE MEDIAEVAL FLORENTINE (TALY) GUILDS OF BLACKSMITHS, ARMORERS AND LOCKSMITHS, DREW MANY
APPRENTICES FROM SONS OF IMPOVERISHED NOBLE
FAMILIES. WAR WAS THOUGHT A NOBLE PROFESSION, AND WORKING ON WAR MATERIAS
WAS DEEMED DIGNIFIED, EVEN

FOR NOBLES

#### Thor Announces Bench Grinders

Substantially built for all-around service in grinding, buffing and wire wheel work, three new Thor electric bench grinders are announced by the Independent Pneumatic Tool Co., 612 W. Jackson Blvd., Chicago, Ill.



The three sizes: — 6" light duty (B-66), 6" heavy duty (B-6), and 7" heavy duty (B-7)—have motors completely enclosed, cool, quiet running and free from vibration. The ball bearings are oversize, dust tight and require greasing attention only once a year.

All sizes are provided with adjustaable tool rests, arranged so that safety glass eye shields can be attached. The wheel guards are extra heavy and on sizes B-6 & B-7 are of the enclosed

type with chutes.

The size B-66 and the B-6 are of the split - phase start, induction - run type and the B-7 is of the capacitor-start, capacitor-run type, with oil-filled condenser in base. The latter, having no centrifugal starting switch, commutator or brushes, is adapted for heavy duty service.



Measures to

Write for catalog
ILLINOIS Testing
Laboratories, Inc.
150 W. Austin, Chicago

sures as well as velocities.



# REPAIR CONCRETE to a TOUGH Feather Edge!

RUGGEDWEAR RESURFACER, made with cellulose, may be used for patching concrete or over an entire area... Indoors or out. Stands up under the heaviest floor traffic. No chopping or chipping required. Merely sweep out the spot to be repaired—mix the material—trowel it on. Holds solid and tight right up to the irregular edge of the old concrete... leaves no joint or crevice to become chipped or filled with dirt. Provides a firmer, tougher, smoother, more rugged wearing surface. Dries fast. Costs only 10c to 14c per aquare foot.

RUGGEDWEAR is the

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Address

FLEXROCK COMPANY

RUGGEDWEAR is the only Resurfacer made with cellulose. Valuable, 60 page "HANDBOOK of BUILDING MAINTE-NANCE" sent FREE to those requesting on business letterhead.

### MAKE THIS TEST!

| Philadelphia, Penna.  |
|---|
| Please send me complete RUGGEDWEAR information details of FREE TRIAL OFFER_ne obligation. |
| Name  |
| Company   |

City

#### Interstate Combines Offices and Warehouse

Machinery Interstate Co., Inc., have moved general offices to their large warehouse at 1431 West Pershing Road. Chicago. The new telephone number will be Yards 5800. The attrac-tive new offices are shown.

The move was made after a careful survey showed clearly that in combining offices and warehouse, they would have improved facilities to handle inquiries and orders more promptly. They will continue to maintain their down-

town branch at 109 South Clinton St., Chicago. It is only a 15 minute run to the warehouse and free transportation is provided.

A new catalog, No. 404 contains descriptions of the large stock of new. used and rebuilt machinery for metal



fabricating, structural metal, production machinery, and machine tools. It is completely indexed, has over 200 illustrations. Over 2000 machines are carried in stock.

### MODEL NO. 16 "SPECIAI

Constructed as per Specifications of U. S. Naval Aircraft Factories



Beware of Imitations!

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of Our machine carries the machine is usually

Battersly trade mark. adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired.

HARVEY MANUFACTURING CORP. 161 Grand St., **New York** 

Phone . . CAnal 6-5170



The valve tappets illustrated are made of S.A.E. 3140 and have a hardness of Rockwell yet KENNAMETAL machined 250 of these pieces per grind of tool at 730 ft. per min. balt chrome alloy machined 25 pieces per grind of tool at

240 ft. per min.). A tungsten carbide tool used on this job did not stand up under the eccentric rough cut-ting, while the KENNAMETAL-tipped tool

remained intact.

Bulletin 740.

KENNAMETAL is the best tool material meehining steel of all hardnesses up to 550 Brinell. Write for your free copy today.







This New Nedco Filler Rubbing Machine has the correct speed. Economical, efficient, low in price, easy to handle, A. C. or D. C., weighs 7 lbs.—Truly a remarkable tool.

Investigate TODAY-Do not delay.

The NEDCO Company



## The ONLY Machine using HIGH SPEED

### BLADES

for High Carbon High Crome Steel-up to 3 Inches Thick

> USES ANY

FILE



## DIE MAKER

Handles most intricate dies with small holes and sharp corners, as only smallest lead hole through which say or file can pass is necessary. Compound angle filing is fast, accurate and easy with the Foley Die-Making Machine. Adjustable table tilts 200 front, 100 back. Ram tilts 200 right or left. Has 6\% throat\_saws to

center of 123/4 piece.
STANDARD OR SPECIAL FILES-From the smallest needle file to the coarsest bastard file can be used in this machine without any special holding fix-

TAKES ANY SAW-Any type of saw from the finest eaw to the high power high speed saw can be used without delay of changing holding fixtures. No holes in blade necessary.

30-DAY TRIAL OFFER

The Foley Die-Making Machine usually pays for itself in 400 working hours. Use it for 30 days in your own plant on our Free Trial Offer. Write today for literature and full details.

## FOLEY MANUFACTURING CO.

28 Main St. N. E., Minneapolis, Minn. Manufacturers of Foley Automatic Saw Filers, Grinders, etc.

#### P&H—Hansen Square Frame Welders

An unusually compact and easily portable welder is offered by Harnischfeger Corp., 4578 W. National Ave., Milwankee. Wis.



Less than a yard long and a foot high, it is said to give the required arc characteristics all the way up and down the range-from 200 down to 15 amperes. Equipped with single current control, there is only one indicator to set. Response is said to be automatic for the desired arc length, under all conditions.

An especially desirable feature is the provision for "stacking" the welders and operating two or more in parallel for high amperage requirements-or the units can be operated individually for the ordinary run of work-providing two separate 200 - ampere services for two welding operators. When used in parallel hookups, connections are made with simple paralleling elements and the multiple shifter sets current on both machines at once. Bulletin W-28 describes the equipment in detail. Bulletin W-26 covers the square frame welder with a range from 260 down to 30 amperes.

#### Double-Floating Box-Type Safety Holder

This Holder is designed for faster and more efficient marking on hot, cold, flat, round, or angular surfaces. will work equally well whether the

# GUARD AGAINST a Dirt and Dust SABOTAGE with a CLEMENTS CADILLAC

Portable Electric
BLOWER & SUCTION CLEANER



Your equipment needs protection against the "fifth column" activities of dirt and dust. It's your protection against dangerous fire hazards and costly repair jobs.

Ask About Our 10 Days Free Trial Offer

CLEMENTS MFG. CO.

## **Clizbe Grinders**



#### **ELECTRIC and MOTOR DRIVEN**

You can grind faster, easier and more economically on a Clizbe. Manufactured for long hard service in every style and size.

Reasonably priced but built to highest standards. Bench or floor type, belt or motor driven, plain or ball bearing.

Send for Cliabe latest grinding data book,

CLIZBE BROS. MFG. CO.

PLYMOUTH :-:

INDIANA

# Ideal Lubrication—Quiet Operation WITH TIMESAVER LAPPING COMPOUND



TIMESAVER PRODUCTS CO.,

A scientific lapping compound especially prepared for the precise titting of all types of Gears, Bearings, Pistons, Slides and Valves.

Elevator Gear and Bearings lapped with Timesaver Compound.

TIMESAVER
COMPOUND
will not imbed into any
metal or continue to cut.
Grades for hard and soft
metals.

Send for Free Sample and Literature on your Letterhead.

33 S. Desplaines St., Chicago, III.

### HART'S DIVIDING HEADS



## For Fast Accurate Indexing

Will divide into all numbers up to 16 and even numbers to 32. Can be mounted quickly and easily on Hart's Milling Fixtures.

Hart's Milling Fixtures can be furnished separately for holding stock from %" to S".

Send for Descriptive Circular.



26 MATHER ST., DORCHESTER, BOSTON, MASS.

surface to be marked is rough sheared, sawed, or ground.





The holder is constructed with a

sleeve which levels or holds the "floating" type holder at right angles on the surface to be marked. The steel type also "float" within the type holder. Because both holder and type are held loosely, a double leveling action takes place when the holder is struck with a hammer.

The holder and type are made from patented safety steel which it is claimed will not spall or mushroom.

The maker is M. E. Cunningham Co., 1115 E. Carson St., Pittsburgh, Pa.

#### Red-E-Set Dial Gage Holder

A new adjustable dial gage holder with universal ball joint and remote control, for all makes of dial gages is offered by the Red-E-Set Company, 513 Fiske Bldg. Boston. Mass.

Fiske Bldg., Boston, Mass.

The ball and socket mounting is claimed to enable gage contact point to touch almost any spot on a spherical surface with only one adjustment.

The primary adjustment is said to handle 90% of the setting. It is easily



## METAL STAMPINGS WITHOUT DIES ? ? ? DON'T MAKE A DIE FOR 1,000 PIECES.

USE A "DIE SUBSTITUTE".

OUR "DIE SUBSTITUTE" MACHINES WILL ELIMINATE THE EXPENSE OF MANY BLANKING AND FORMING DIES.
DUPLICATE METAL STAMPINGS ON A SEMI-PRO-

DUCTION BASIS.
PRECISION BENCH MICRO BENDERS, BRAKES,
FOLDERS, NIBBLERS, PRESSES, PUNCHES, ROD CUTTERS, ROLLERS AND SHEARS.

ASK YOUR JOBBER OR WRITE:

O'NEIL-IRWIN MFG. CO., 316 8th Ave., So. Minneapolis, Minn.

#### MICHIGAN BOULEVARD

# CHICAGO

The pulse of the city—Michigan Boulevard. Chicago works and plays to the tune of its rhythmic hum. In the most convenient location on this famous thoroughfare, Hotel Auditorium provides spacious pleasant rooms, excellent service and superb cuisine, at reasonable rates.

WITH BATH from \$2.50 WITHOUT BATH from \$1.50

MINK Mgr.



MICHIGAN AT CONGRESS

AUDITORIUM

# - Plexible Couplings

Unusually
RESILIENT
YET
SAFE



TYPE IA PATENTED

L-R Type IA, three-part coupling has a resilient cushion spider that absorbs shock loads safely. Non-lubricated, practically everlasting. LOW UNIT COST. Sizes 3/16\* to 21/4.\*



Test Sample?

Send H.P., R.P.M. and shaft dia. for test sample. Write for **free** catalog, too.

Love ou Flexible Coupling Co SOZEW LAKE ST CHICAGO ILLINOIS

## NICHOLSON CONTROL VALVES

are made in two, three and four-way types for air, oil, water, steam, gas, etc., pressures to 5000 lbs. Style E is a general purpose valve for pressures to



Style J

300 lbs. Various metal combinations to suit any medium. Style J is for air and oil only, pressures to 125 lbs. Style H is a balanced hydraulic valve for pressures to 5000 lbs. We also manufacture foot, solemoid and motor-operated valves.





Bulletins on request.

OTHER NICHOLSON PRODUCTS: Mandrels, Arbor Presses, Flexible Couplings, Steel and Stainless Steel Floats, Steam Separators, Steam Traps, Air Separators, Air Traps, Air Vents, Etc.

W. H. Nicholson & Company

117 OREGON STREET

WILKES-BARRE, PA.

## EVANS High Speed Steel REAMERS



#### LOOK AT THESE FEATURES

- No honing. Will not chatter.
  - Chrome-like finish.
- Perfect alignment.
- Full bearing surface. Left and right spirals.
- 50 to 80 thousandthe expansion.
- Cannot fall in slots or oil grooves. Extension pilots for line-up work.

WILL SHIP ON 30 DAY'S TRIAL

EVANS FLEXIBLE Ravenswood & Wilson Ave.,

REAMER CIRCULAR Chicago, Ill.

#### Minimize Maintenance Costs On All Compressed Air Operated Equipment With ARIDIFIERS!

Up to 48% of your air operated equipment maintenance are due to moisture, oil or dirt in your air lines. Rapid tool wear, freezing, sticky valves, corroding and pitting of rings, pistons and operating parts plus the need for daily cleaning \_can all be avoided by putting an ARIDIFIER on every air and gas line to INSURE DRY, CLEAN AIR AND GAS.

ARIDIFIERS are easy to install, operate at no back pres-sure, have no rapidly wearing need no maintenance. parts. Quickly return their cost, Sizes from 36 to 10".

### DRY CLEAN AIR



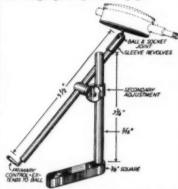
Drain

#### FREE TRIAL OFFER

We will gladly send you an ARIDIFIER for 30 days free trial! Send for Engineering Bulletin No. 939.

#### LOGAN ENGINEERING CO. 4916 Lawrence Ave., Chicago, III.

accessible, 51/2" from the work. A secondary adjusting clamp device serves for rough placing of the gage.



No springs are used in the device and the tubular construction assures rigidity. With a 2" disc for the gage mounting, weight is said to be under 7 oz.



Here's how to get real value from your grinding wheels. Dress and true them regularly. Use Vincent Improved Huntington dressers equipped with Vincent high-carbon tool steel cutters. Your mill supply distributor can supply them, and they cost no more than the ordinary kind.

Insist on the dresser with the aluminum finish. Write for descriptive catalog sheets.

THE VINCENT STEEL PROCESS CO. 2434 BELLEVUE AVENUE DETROIT, MICHIGAN

#### G-E Geared-Type Limit Switch

A new, small-size geared-type limit switch is announced by General Electric for application to motor-driven devices where it is necessary to limit the rotation of the motor shaft or some rotating shaft or gear on the driven machine. Such devices include automatically operated devices, and certain types of machine tools. The switch is compact, measuring 4-11/16" x 3-½" x 1-29/32".

In use, the shaft of the switch (which is usually directly connected to an electric motor) serves as a driving gear, causing the pinion shaft to turn. The pinion shaft engages the driving gears which move along the drive screw toward one of the operating gears at either end, depending on the way they are turned by rotation of the pinion shaft. For one adjustment, the traveling gears maintain a constant space between them.

At the end of travel in either direction, a pin on the traveling gear engages a pin on the operating gear. This causes the operating gear, cam, and safety pin, which are a unit, to rotate and move the switch contact arm to a high part of the cam, operating the contacts. These contacts are designed for 125-volt, 4-ampere a-c operation and 125-volt, 1-ampere d-c operation.

#### **Boice-Crane Expands Line**

The Boice-Crane Co., 1729 Norwood Ave., Toledo, Ohio, are now manufacturing several new models of their %" capacity "Helmet-Head" drill presses with completely enclosed drive.

Models added include single and multiple spindle floor types; Morse taper spindle types; a complete range of slow-speed models (5 speeds from 425 to 3340 r.p.m.) in single and multiple bench floor types.

Several high speed tapping machines have been added to the "Helmet-Head" line. Also, separate drill press heads, columns and column flanges are now available for building up low-cost, special drilling, reaming and tapping tools.

Complete details are given in a new bulletin. Is YOUR PROBLEM that of a Tight Seal? Then let

# TiteSeal

America's Premier

Gasket & Joint-Sealing Compound SOLVE THAT PROBLEM!

Tite Seal

comes in 5 densities for practically EVERY SEALING NEED



and in several convenient sizes.

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| RADIATOR  | SPECIALTY | COMPANY |
|-----------|-----------|---------|
| CHARLOTTE |           | N. C.   |

Send TiteSeal samples and information to:

FIRM...

ADDRESS .....

CITY

#### Federal Dial Feed Press

A special auxiliary safety stop prevents damage to dies in case of a jam. The design of the press permits an exceptionally wide range of tooling. The indexing system is built into the standard Federal chassis. The exclusive design of Federal cams assures positive indexing and locking mechanism with smooth action. With Federal automatic loading and ejecting mechanism, it is claimed a production of from

9,000 to 10,000 units per hour can be accomplished. The presses are furnished





# The GEMCO KEYSEATER

Bench and Floor Type

This inexpensive compact Keyseater will accurately do the work of a high priced power-driven machine. It will cut Keyways 4,5 to 24,6 hore as standard; or if desired larger bores can be arranged. Keyways up to 78 in length, either straight or taper can be made.

#### The Following Cutters Are Standard on THE GEMCO

With the ½° bar: ½° and ½° Cutters, With the ½° bar: ½°, ½°, ½° and ½°, cutters. With the 1° bar: ½°, 5%°, ½°, ½°, and ½° Cutters.

Cutters also in thirty-second sizes.

Write for sizes, prices and information.

GIBRALTAR EQUIPMENT & MFG. CO.
Madison at 14th St. - St. Louis, Missouri

either with or without the automatic loading and ejecting feature by Federal Press Co., Elkhart, Ind.

eral Press Co., Elkhart, Ind.

Eliminating "Wet Air" Troubles
The Aridifier, made by the Logan En-

gineering Co., 4916 Lawrence Ave., Chicago, is claimed to eliminate troubles arising from moisture, oil, dirt and scale in compressed air lines.

This unit, encircled in the picture,



### MACHINE TOOL DRIVES WITH A RESALE VALUE

Cullman Drives are recognized on the Machinery Markets of the World.

Cost of Cullman Equipment will be returned at time of trading in your Machine Tools.

NEW YORK TRIBUNE SLOB, CULLMAN SALES CO. 1702 KALES BLDG.

Check the Items in Which You Are Interested and Mail to Hitchcock Publishing Co., 508 South Dearborn, Chicago

Please limit your choice to the ten items in which you are most interested

| Abrasive, cloth,                           | Cement, disc grind-<br>ing wheel                         | Drill Bushings                              | Gears, rawhide and                           |
|--|--|---|--|
| Adapters, adjustable Arbors & Mandrels     | Centering Machines Centers, lathe Chains, silent, roller | Drill grinders Drill speeders               | Gear Pumps Generators                        |
| Balancing Ways                             | Chain Drives   | □Drill Twist □Drills, attachments,          |  |
| Baling Presses                             | Chamfering Machy,  | high speed                                  | Goggles                                      |
| Band Saw Machines                          | auto.  | Drills, automatic                           | Grease Grinders, pneumatic                   |
| ☐Bar Cutters<br>☐Bars, boring              | Chucks Chucks, air                                       | Drills, bench Drills, fully geared          | Grinders, air                                |
| Bearings, Ball                             | Chucks, auto.  | Drills, multiple spdl.                      | Carindare banch                              |
| Bearings, oilless                          | Chucks, collet   | Drills, portable elec.                      | Grinders, disc                               |
| ☐Bearings, roller<br>☐Bearings, tapered    | Chucks, combination                                      | Drills, radial                              | Grinders, external                           |
| roller                                     | OChucks, geared scroll                                   | Drives, variable                            | Grinders, flex. shaft                        |
| Bearings, thrust                           | Chucks, geared scroll                                    |   | Grinders, internal                           |
| Belt Fasteners,                            | Chucks, magnetic   | □Emery Wheels                               | Grinders, ped., elec                         |
| metal, leather  Belt Lacing                | Clamping devices,<br>air operated                        | □End Mills                                  | Grinders, pol., belt                         |
| Belt Sanders                               | Clutches   | ☐ Engraving Machines ☐ Etching Mach., elec. | Grinding Attach.                             |
| Belts, V Type                              | Coil Winding Equip.                                      | Exhaust Blowers                             | Grinding, centerless (contract)              |
| Bending Machines,                          | Collets, feed fingers                                    | Extractors, tap                             | Grinding Mch., bell                          |
| Bending Machines,                          | Compressors, air   |   | Grinding Mch., inter.                        |
| power                                      | Controllers  | Facers, spot                                | Grinding Mch., cut., reamer and tool         |
| Bending Machines,<br>angle iron            | Conveyors Counterbores                                   | ventilating                                 | Grinding Machines,                           |
| Bending Machines,                          | Countershafts  | Files                                       | portable elec.                               |
| hydro                                      | Counting devices   | Files, rotary Machines                      | Grinding Mch., surf.                         |
| Bending Machines,                          | Couplings, shaft   | Filing Room Equip.                          | Grinding Mch., tool                          |
| Bending Rolls                              | Cranes, traveling Cranes, locomotive                     | Flangers, hand, pwr.                        | Grinding Spindles                            |
| Blocks, chain                              | Cranes, portable   | Flexible Shaft Equip.                       | Grinding Wheels                              |
| Blowers                                    | Cut-off machines   | Forges                                      |  |
| ☐Blueprint Machy.<br>☐Bolt & Nut Machy.    | Cutter grinders  | Forging (Upsetting)                         | □Hack Saw Blades                             |
| Boring Heads                               | Cutting Compounds  | Machinery                                   | ☐Hack Saw Machines<br>☐Hammers, port., elec. |
| Boring, drill, Machy. Boring & Turn, Mills | Cylinders, air   | □Forgings, drop<br>□Forgings, upset         | Hammers, drop                                |
| Boring Machines, jig                       | □Demagnetizers   | Forming Machines                            | Hammers, forg. air                           |
| Boring Tools                               | □Diamonds  | Foundry Equipment                           | Hammers, helve riv.                          |
| Brakes, hand, power                        | Diamond Tools  | Furnaces, hardness Furnaces, heat treat-    | Hammers, soft                                |
| □Brazers, electric<br>□Broaching Machine   | Die Casting machines                                     | ing, Electric                               | ☐Hammers, steam                              |
| Tools                                      | Die Sinking Machines                                     | Furnaces, heat treat-                       | ☐Hand Saws, p. elec.<br>☐Hobbing Machines    |
| ☐B iffers                                  | Die Stocks   | ing, oil or gas                             | Hobs Machines                                |
| ☐Buildozers<br>☐Burnishing Machy.          | Die Cushion Die Duplicating                              | □Gages                                      | ☐Hoists, chain                               |
| Bushings, brass                            | Machines   | ☐Gage Blocks                                | Hones  |
| Bushings, bronze                           | Die Filers   | Gages, comparator                           | Honing Mch., cyl.                            |
| Bushings, hardened                         | Dies, blank, forming Dies, hole punching                 | Gages, dial                                 | Hose, rub., metallic                         |
| Bushings, jig Bushings, steel              | Dies, thread rolling                                     | ☐Gages, plug, ring,                         | and Tools                                    |
|  | Dies   | Gages, taper                                |  |
| FIG. biseds Elica                          | Dividing Heads   | Gages, thread                               | □Index Fixtures                              |
| Cabinets, filing                           | Dowel pins, steel Drafting Machines                      | □Gears<br>□Gar Blanks, non-met.             | □Indicators                                  |
| Case Hardening                             | Drawing Instruments                                      | Gear Cutting Machy.                         |  |
| Furnaces                                   | Dressers   | Gear Testing Machy.                         | □Jig Borers                                  |
| Castings                                   | Drill Presses  | ☐Gears, cut                                 | ☐Jigs & Fixtures                             |

Continued on following page

| Keyseating Machines Knife Grinders   | Nut setting equip.   | Rotary Files Router Bits   | Tap Holders Tapping Mchy. & At.  |
|--|--|--|--|
| Knife Grinders Knurling Tools Lapping machines Lapping wheels, dia. Lathe live centers Lathes, bench Lathes, polishing & buffing Lathes, precision Lathes, toolroom Lathes, toolroom Lathes, toolroom Lathes, toolroom Lathes, tworet Lathes, synnning Lathes, synnning Lathes, extension bed and gap Lathes, double end Layout fluid Layo | Nut tappers  Oil cups Oil and grease seals Oil groovers Oils, cutting Oils, lubricating Oils, lubricating Oils, lubricating Oils, lubricating Oils, quench. & tem.  Patterns Pillow Blocks Pins, leader & dowl. Pipe, cutting and threading mch. Plate Rolls Press Fraeds Presses, arbor Presses, broaching Presses, broaching Presses, broaching Presses, fort Presses, inclinable Presses, hydraulic Presses, power Presses, punch Presses, prower Presses, proming Presses, prower Presses, prower Presses, screw Presses, proming Presses, straighten. Profiling Machines Pumps Pumps, coolant, Ubricant & oil Punching Machy. Punching Machy. Punching Machy. |  | Tapping Mchy. & At. Taps. collapsing Thread Grind. Mch. Thread Grind. Mch. Thool Holders Tool Holders Tools, boring Thools, cutting Thools, cutting Tools, filing Tools, filing Tools, sawing Trools, sawing Tracing cloth and paper Iracing cloth and paper Irransmission. ver. sp. Tube Flang. Mchy. Tumbling Barrels Turning Tools Universal Joints Valves, hydraulic V Belts Vises, pipe Vises, pipe Vises, pipe Vises, pipe Vises, pipe Gases Welders, arc Welders, arc Welders, portable |
| Milling Mch., duplex Milling Mch., hand Milling Machines, Lincoln type Milling Mch., pl. ty.   | Punches & Dies Pyrometers  Racks, gear, cut  | Shears, squaring Sheave wheels Shelving, steel Shop lights Sine Bars | Welders, elec. spot Welding Gen., arc Welding Mch., resist.  |
| Milling Mch., univ. Milling Mch., horiz. Milling Mch., plain Milling Mch., vert.   | Racks, bar stock Radiators, Japanning- oven Reamer Holders   | Slotting machines  Sockets Soldering Tools, elec. Speed Reducers     | Wire-Working Mchy. Wood-work, Mchy. Wrenches   |
| Milling Mch., uprgt.  Mold & Die Cop. M.  Molded plastic prod.  Molybdenum  Motors   | Reamers adjustable Reamers, adjustable Reamers, taper pin hole Reaming machines  | Spring coiling and forming machy. Sprockets Stampings Steel          |  |
| ☐Motor-generator sets<br>☐Motor drives, univ.<br>☐Motor starters   | Regulators, temp. Rivets Riveting Machines Rod Cutters   | Steel Stamps Stocks, die Storage Racks Straightening Mchy.           | ***************************************  |
| □Name plates □Nibbling Machines  | Rope drives Rotary Converters  | Stripping Units Swaging Machines                                     |  |

### Kindly send catalogs and information on items we have checked.

| Name      | Title |
|-----------|-------|
| Firm Name |       |
| Street    |       |
|           |       |



STYLE A

## The HAMILTON PORTABLE ELEVATING TABLE—"PORTELVATOR"

No strained backs or bruised fingers if you let the Hamilton "Portelvator" do the lifting for you. Use it as means of support—Use it to level large overhanging

Use it as means of support—Use it to level large overhanging pieces of work—Use it as a bench to work on—An economical and efficient helper—One to twenty ton hand or power operated.

Write for full details today.

## THE HAMILTON TOOL COMPANY R AND WAYNE STS., HAMILTON, OHIO

effects removal by means of centrifugal force. A series of ball bearing aluminum rotors, driven at high speed



by the compressed air, with no appreciable back pressure, causes impingement of moisture and contamination

which is flung to the housing wall, out of the air stream, and down to an outlet below the rotors. Objectionable matter, thus removed, is collected in

a trap for periodical disposal.

The unit shown, is providing clean, dry air to ejection equipment on punch presses in a radio parts plant.

Aridifiers are recommended for compressed air lines supplying sand blast equipment, spray booths, air tools and controls, foundry machines, tire inflators and other equipment, being available for lines from %" to 10".

#### Bender Bulletin Shows Uses

A new bulletin issued by O'Neil-Irwin Mfg. Co., 316 - 8th Ave., So., Minneapolis, Minn., shows many unusual parts which can be made. The new Micro Multi-Purpose Bender is a compact tool for bench use and its versatility is demonstrated in the making of round, odd or irregular shapes of different sizes. It forms any radius from 0 to 6" diameter.

## \$ 5 Buys a *GOOD* Surface Plate



WHY LET YOUR MEN WASTE TIME WITH A POOR ONE? Here is a surface plate that has every feature you want for good layout work. Massive design and heavy ribbing to prevent warping. Surface precision ground to close limits. All edges machined square with each other and with the face. Wide ledges all around for clamping work, angle plates, vises, etc., impossible to do with improvised plates. Two sizes: 15" by 18" and 16" by 22", at \$15.00 and \$22.50. At these prices you cannot afford to be without good surface plates. Order from

Delta Manufacturing Co., 629 E. Vienna Ave., Milwaukee, Wis.

## THREE SHORT CUTS TO LOWER COSTS-





Easily interchangeable inserts adapt IDEAL Lessing interchangeanie inserts adapt in the Live Conterted and uncentered work . . . reduce set-up time. Male Insert for work already centered; Plain Female Insert for uncentered work; Female Insert with three raised lands for flat or burred keyway.

#### BALANCING IDEAL



Simplifies balancing of crank shafts, pulleys, fly wheels, while armatures rewinding, etc. No center required work carried on free-turning nickel, semi-steel discs mounted on preci-sion ball bearings.





**Electric Etcher** 

The last word in etching equipment? Etching tool terminals, leads, work-plate and transformer entirely self-contained in beautiful streamlined case. Permanently marks iron,

steel or their alloys.
Other IDEAL Electric Etchers and Markers
Available . . . The Most Complete Line of
Marking Tools On The Market!

Over 35,000 Satisfied Users

### Ideal Commutator Dresser Co.

SYCAMORE, ILLINOIS 1441 PARK AVE.,

An Eastern reader inquires concerning the Diehl filing machine. would appreciate descriptive literature and information concerning its operation and capabilities.

A farm implement manufacturer needs a gear hobbing machine which can be used for cutting teeth on worm gears, and also for cutting splines on shafts.

#### -50-

A manufacturer of watch cases is looking for a small automatic screw machine to turn pins with one and/or two shoulders from stock of about is to 3/32" in diameter. Machine would probably be of the bench type and smaller than most of the automatics offered on the market.

#### -51--

A Southern machine works would like to purchase a galvanizing outfit for handling tanks 30" in diameter and 10 feet long.

A Midwestern manufacturer is anxious to obtain a fixture for holding tools on a planer which will swing on a 16" radius.

#### -53-

An Eastern reader wants to get in touch with a manufacturer of Loping Shears-adjustable leverage, point cut. Also, with the manufacturer of the Weaver Spot Welder.

#### -54-

A manufacturer of stampings inquires about a practical die maker's hand book, covering standard practices, tolerances and methods of making drawing, blanking and forming dies for sheet metal.

An Eastern manufacturer wants to purchase an automatic nut machine, using hexagonal stock from 3/8" to 7/8"—

# Bag

threads .205-28 to 7/16" S.A.E. Must finish nut including tapping. Present production rate is 24 seconds which is too slow.

-56-

A reader in the East needs some pinion, gear and rack equipment. It includes a 7-tooth gear driving a 70-tooth gear and the latter can be between ½" and 1" in diameter. A pinion, integral with the large gear engages a rack with 40-teeth to the inch. The gears must be sensitive to the slightest movement of the rack—even .0001".

\_57\_

A manufacturer wants to get in touch with the manufacturers of the J. Morton Poole Roller Leveler.





## Work Wanted

A NATIONALLY KNOWN MANUFACTURER OF PRECISION MACHINERY HAS FACILITIES FOR TAKING ON ADDITIONAL WORK for: W. & S. Turret Lathes, Boring Mills, Lathes, Punch Presses, Screw Machines, Precision Cylindrical and Internal Grinding, also Sub or Full Assembly Work.

### **BOX 142**

c/o Hitchcock Publishing Co. 508 S. Dearborn St., Chicago, Ill.



## LUFKIN CHROME FACE

Jet black markings on the Satin Chrome surface are easy to read even in poor or artificial light. The smooth chrome surface won't rust, crack, chip or peel. That's why you should own a new Lufkin Chrome Face Steel Tape.

WRITE FOR FREE CATALOG

THE LUFKIN RULE CO.

SAGINAW, MICH. . New York City

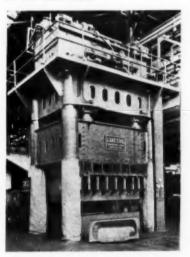
#### Giant Double Slide Press

A double slide hydraulic press having a capacity of 1700 tons and claimed to be the largest of this type, is announced by Lake Erie Engineering Corp., Buffalo, N. Y.

One of the many operations performed on this press is shown in the foreground—a steel bathtub.

Five-foot tubs are formed cold, 65" x 79", in one operation from 14 gauge sheets.

The press exerts a pressure of 900 tons on the blankholder and 800 tons on the main ram.



The high holddown pressure eliminates wrinkling of the edges of the sheet when forming the tub without the use of draw heads.

Press has a speed of several cycles per minute. Actual installations is shown, with top of bed located at floor level. Vertical columns are covered by flexible fabric boots, giving protection against abrasive dust resulting from dressing dies.

Entire press is self-contained with

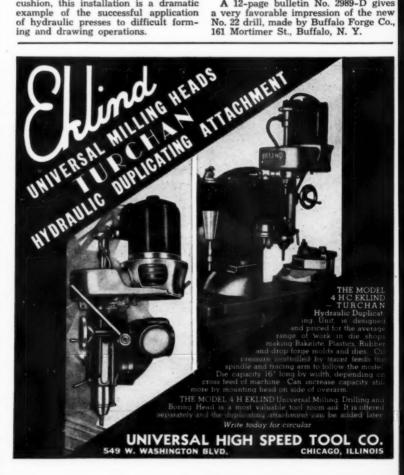
pumping unit mounted on top. Operation is controlled by centrally located pushbuttons. Adjustable pressure con-trol of blank-holder and main ram is provided.

With large daylight opening of 98" and long stroke of 37", together with large 160" x 106" bed equipped with cushion, this installation is a dramatic example of the successful application Gage Blocks and Accessories

Catalog No. 15 presents 36 interesting pages on the Johansson gage blocks, made by Ford Motor Co., Johansson Division, Dearborn, Mich. The introduction tells of the development of the gages and many photos show some of the ways in which they are used.

**Buffalo No. 22 Drill** 

A 12-page bulletin No. 2989-D gives a very favorable impression of the new No. 22 drill, made by Buffalo Forge Co., 161 Mortimer St., Buffalo, N. Y.



## HAMMOND

### **GRINDERS**

Tool, Production and Disc 1/4 H. P. to 20 H. P.



### POLISHERS

1 H. P. to 50 H. P.-A model for every application



A MODERN, UP-TO-DATE LINE of Quality Grinders and Polishers.

 Pin our signature to your letterhead for complete literature.



1614 DOUGLAS AVE.

#### Johnson "550" Has New Housing Unit

The Johnson Gas Appliance Co., 524 E. Ave. N. W., Cedar Rapids, Iowa, announces a new housing unit for the No. 550 pot-hardening and melting furnace for non-ferrous metals. Standard models are now built to the floor, instead of having legs, making them more substantial, easier to keep clean, and simpler to keep surroundings clean.

The No. 550 furnace is designed especially for salt, cyanide and lead hardening, and saves heating a large furnace for a few small parts, being especially convenient for small shops.

The No. 550 is also used widely by tool and die makers, and small plants for case hardening, and by pattern and model makers for melting small quantities of aluminum, brass and nickelsilver. It is furnished with crucible or cast iron pot, or with pot at extra cost. The temperature is easily regulated, and gas consumption is said to be low. It can be made to the users specifications.

#### **Tungsten Electrical Contacts**

Metroloy Co., Inc., 57 East Alpine St., Newark, N. J., are now manufacturing electrical contact points made from highly fused pure tungsten metal. It is claimed this assures uniformity in grain structure, and eliminates excessive oxidization or pitting during operation periods.

The purity of this metal is said to prevent film coatings from adhering to contact surfaces during the time when apparatus is not operating or at

shut-down intervals.



MODERNIZE present equipment with a RUSSELL BORING BAR. Bores 9/16° to 12° to dia. with boring axis parallel to shank axis One compact tool, with micrometer adjustment.

RUSSELL BORING BAR CO. MIDDLETOWN, OHIO

## SHARPEN YOUR OWN SAWS SAVE OVER 80% ON SHARPENING HACK, BAND, CIRCULAR SAWS



The WARDWELL MODEL EC COMBINATION SAW SHARPENER will automatically sharpen saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

### **AUTOMATICALLY SHARPENS METAL SAWS IN GANGS**

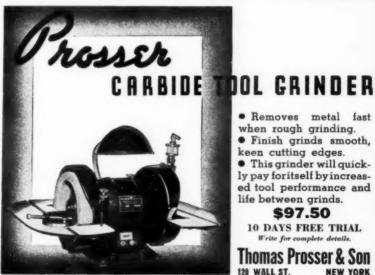
Up to  $5\frac{1}{2}$  diameter and up to  $1\frac{3}{4}$  thickness. 100 SAWS of 26 GAUGE CAN BE SHARPENED AT ONE TIME.

The saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

Write for complete information

THE WARDWELL MFG. CO. 3165 FULTON RD. CLEVELAND, OHIO





 Removes metal fast when rough grinding.

 Finish grinds smooth, keen cutting edges.

 This grinder will quickly pay foritself by increased tool performance and life between grinds.

\$97.50

10 DAYS FREE TRIAL Write for complete details.

homas Prosser & Son

#### Gellert Tongs for Heavy Duty Handling

In plants where materials have to be handled by cranes or hoists, which in-



cludes practically every industry, the use of Gellert tongs, now produced exclusively by Heppenstall Co., Pittsburgh, is said to decrease hazards to life and limb, and to cut lost time to a minimum.

All that is required is to lower the tongs on to the work, and they do their job automatically. The craneman has entire control, and ground men do not have to throw chains around hot ingots or forgings, or climb to the top of scrap piles with danger of slipping or being crushed by material rolling down.

Several types are in successful operation in steel mills and foundries for handling ingots, ingot molds, die blocks, pipe, and wire; and other special designs are made for non-ferrous metal ingots or shapes, paper bales, sacks of sugar and similar materials. Lifting capacities run as high as 200,000 pounds.

To assure freedom from failure and long operating life, the working parts of these tongs are made of a nickel-chromium - molybdenum steel, corresponding to S. A. E. 4340, heat treated to provide ample strength along with toughness to resist shock loads.

#### Hisey-Wolf Refines Line

A noteworthy change of design has been effected in the direct drive disc grinders made by The Hisey-Wolf Machine Co., Cincinnati, O. Extra heavy end bells with feet are employed, which carry the bearings directly behind the discs. The bearing construction has been improved, as has the method of lubrication. Oilers are of the constant level type with sight supply.

The motor is totally enclosed with a circulation of air passing through motor, through feet of end bells into pedestal and back through motor again. This is claimed

to afford the advantages of a totally enclosed motor with the added feature of cooler operation.

The machines are made in sizes from 3 to 10 h. p.



Guards can be supplied with exhaust connections. Combination machines can also be furnished with disc on one end and a regular grinding wheel or buffing extension on other side.

#### **Haynes Stellite Expands**

Haynes Stellite Co., Unit of Union Carbide and Carbon Corp., is expanding manufacturing facilities at its plant in Kokomo, Ind., by the addition of a new 75 x 132-ft. factory building, a one-story structure of steel and brick with concrete floor and wide monitor top. It is expected that the building will be ready for use in August. Some of the features of the building are:—continuous steel sash for efficient lighting; large ventilating fans for rapid air change; gypsum roof; modern toilet, locker, and shower facilities.

The new building will house machinery to be used in the manufacture of Haynes Stellite alloy products: metal-cutting tools, hard-facing rods, and special castings for resisting abrasion, corrosion, and heat. This new space will provide room for additional machinery and equipment for the fabrication and finish grinding of Haynes Stellite alloy parts, and at the same time improve the facilities for fabricating and finishing the Hastelloy alloy parts made by the company for resisting severe corrosive conditions.

#### **Totally-Enclosed Motors**

A new 4-page illustrated leaflet describing type CS totally-enclosed-fancooled squirrel cage motors from one to two-hundred horsepower is announced by Westinghouse. These motors are designed especially for operation in locations where corrosive fumes, abrasive dust, or splashing liquids are prevalent, and for use out-of-doors.

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Copies of descriptive data 3105 may be obtained upon request from Dept. 8-N-48, Westinghouse Elect. & Mfg. Co., East Pittsburgh, Pa.

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Press, doll, crank, Stoll 79-D, 72"x28", m. d.

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## Russell Machine Co. 438 Oliver Bldg. Pittsburgh, Pa.

438 Oliver Bldg. Pittsburgh, Pa Boring mill, 12" Gisholt, 2 heads., m. d.

Boring mill, 16' Niles vertical.

Cranes, 5 ton Shaw, EOT. 86' span, 3 motor. (2)

Drill, radial, 8' American triple purpose.

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Gear cutter, 36' Brown, & Sharpe.

46' Morton Kerway cutter, can, 3f' wide.

Lathe, 38"x36' Pittsburgh geared head, m. d.

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Lathe, turret, 3f'x26" Pratt & Whitney, g. h., b. d.

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Planer, openside, 46'x68'x13', D. & H., 3 hds., m. d.

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Shaper, 24' Gould & Eberhardt

Shaper, 24' Columbia, d. h. g., gear box, m. d.

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Upsetting machines, 2f., 3f, 4 and 5" Ajax iron bed.

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Hundreds of other items priced low.

#### R. S. Armstrong & Bro. Co. 676 Marietta St., N. W., - Atlanta, Ga.

676 Marietta St., N. W., - Atlanta, Ga.
Compressor, 12x10, 1-R., horizontal, b. d.
Compressor, 12x10, 1-R., horizontal, b. d.
Drill press, 36" Superior, sliding head, b. d.
Hack saw, No. 7 Atkins, b. d., 2-speed.
Keyseater, No. 2 Mitts & Merrill, b. d.
Lathe, 18"24" Bradford, 1. c. g., tapper att., b. d.
Lathe, 18"35" Acme universal turret, air chuck, m. d.
Miller, No. 14 Queen City plain, b. d.
Miller, No. 4 Kempsmith plain, b. d. and feed.
Motors, electric, large quality.
Press, No. 18 Bliss o. b. i. b. d.
Shapers, 16" Barker and American, 24" Cincin., b. d.
Shear, Thompson bevel patch
Shear, No. 2 Bethlehem circle, b. d.
Welding generators, acetylene, 19-39-39 pound.
Send us your inquiries.

## The Reeve-Fritts Company 28 N. Clinton St., Chicago

25 N. Clinton St.,
Boring machine, No. 1 Barrett, cylinder.
Drill, No. 3 Barnes horizontal, double head.
Drill, 25 Foadick radial, round column.
Gear hobber. No. 1 Adams Farwell.
Grinder. Gisholt universal.
Lathe, 22"x14" Davenport, q. c. g.
Saw. cold, Lea-Simplex. 55".
Screw driver, No. 2 Reynolds, auto. feed.
Screw machine, 3" Cleveland automatic "A".
Turret lathe, 18" P. & W., geared head.

## H. F. Wolnick Machinery Co. 9 S. Clinton Street. Chicago, Ill.

Boring mill, 8' Niles vertical, 2 threads, back drive. Generator, 6'x11" Gleason, bevel geared. Lathe, 15x8 Pratt & Whitney.
No. 4 Warner & Swasey, motor drive with motor. Mill, No. 14 Becker Plain.
14" Pratt & Whitney vertical surface grinder with chk. Mill. No. 23 Kempsmith production.
Planer, Ohio, 24x24x6.
Punch and shear, 4"x10' Cincinnati, motor drive. Shaper, 24" Smith & Mills.

#### FOR SALE BY

#### B. D. Brooks Co., Inc. 119 Broad St. Boston, Mass.

Sheet metal working machinery, hand and power. All types of new and reconditioned equipment. Apron brakes, press brakes, shears, folders, Bending rolls, corrugating rolls, forming rolls, Punches, beaders, rotary machines, stakes, etc.

#### The State Machinery Co., Inc. 865 Congress Ave., New Haven, Conn.

| A Few, Like New Items, from our Stock.          |     |
|---|-----|
| Arbor presses, No. 17 Greenerd, (10), ea.       | 225 |
| Arbor, presses, 8 Greenerd, (3), ea             | 475 |
|   | 850 |
| Wheel polisher, centerless, Production, No. 101 | 575 |

#### FOR SALE BY

#### Bleser Machinery Company 200 N Sixteenth St Springfield III

| and in distremin being   | - phimenoral am |
|--|-----------------|
| Air compressor, auto. unit, 5  | h. p            |
| Drill presses, 20" to 34".<br>Lathe, 15"x6' LeBlond, q. c.<br>Hammer, power trip, 25 lb. l<br>Press, punch, 14" stroke | . t. a          |

#### C. R. Daniels 1514 W. Capitol Drive, Milwaukee, Wis.

Hack saw, No. 1 Marval 4x4, rebuilt, \$22.00. Keyseater, No. 2 Mitts & Merrill, complete. Pressure blower, Wilbraham positive, 2340 ft. Press, No. 2 Toledo O. B. I., flywheel type. Press, 400 ton Bliss, No. 358 double toggie.

#### Marr-Galbreath Machinery Company

Marr-Galbreath Machinery Company
Air compressor, 9x3" & 14x12" Ing-Rand.
Ball or jar mill, 2-jars 10x13", belt or m. d.
Bolowers, (furnace) No. 2 Knight; No. 2 American.
Blower, pressure, No. 11-PB Am, 14375 cfm., m. d.
Bolt cutter, 14" Landis, sgl. head.
Boring mill, 34" Bullard vert, threading attach., b. d.
Boring mill, 34" Pond, 2-hds, Fctn. feed, c/s.
Brake, 8"x12 ga. Chicago, power, belted.
Brake, 6"x12 ga. Chicago, power, belted.
Drill, radul. 2" Am., garb box, s. p. d.
Drill, radul. 2" Am., garb box, s. p. d.
Drill, radul. 2" Am., garb box, s. p. d.
Drill, radul. 3" and 4" Dresse.
Driller, hortz., 6 spindle Nat'l. Acme, No. 2 chucks.
Drill, gang, 3 and 4 spindle, 1 to 4 MT.
Exhauster, No. 35 Baffaio, outlet 12x14", m. d.
Fan, ventilating, 24" American, m. d., 1/60.
Forging machine, 14" Acme, alst set., side shear.
Formace, 7-1, 23x23x12" ID. 1760c f.
Gear phinon, No. 3 Stoan & Chase, auto. bench.
Grinder, No. 12 Besley, double and disc.,
Grinder, No. 21 Landis, plain, 10x30", c. s.
Grinder, portable surface, No. 8-OA, motor, 3/60.
Grinder, surface, 38x24" Diamond, hyd. feed. m. d.
Grinder, surface, 38x24" Diamond, hyd. feed. m. d.
Grinder, surface, 38x24" Diamond, hyd. feed. m. d.
Grinder, wo. 10 b. Boss, No. 2, with dies, belted.
Hammers, 300 lb. Boss, No. 2, with dies, belted.
Hammer, 300 lb. Boss, No. 2, with dies, belted.
Hammer, 100 lb. Chbg, steam drop, double frame.
Hoists, Canton No. 1 portable.
Hammer, 100 lb. Chbg, steam drop, double frame.
Hoists, Canton No. 1 portable.
Lathe, 11/18" Arisan, q. c. g., s. p. d.
Lathe, 11/18" Arisan, q. c. g., s. p. d.
Lathe, 11/18" Arisan, q. c. g., d. b. g., chuck.
Lathe, 11/18" Arisan, q. c. g., d. b. g., chuck.
Lathe, 11/18" Arisan, q. c. g., d. b. g., chuck.
Lathe, 11/18" Arisan, q. c. g., d. b. g., chuck.
Lathe, 11/18" Arisan, q. c. g., d. b. g., chuck.
Lathe, 11/18" Arisan, q. c. g., d. b. g., c. Lathe, 21"x10" Motors, 10 No. 10 No.

#### 57 Water St.,

#### Pittsburgh, Pa.

Motors, 28 h. p., Allis-Chalmers 3/40/220/480 rev. Motors, 30 & 40 h. p., West, CS. 3/80/220/480 rev. Motors, 30 & 40 h. p., West, CS. 3/80/220/480 rev. Nailing machine, No. 6 Morgan, 6-track, m. d. Nibbling machine, No. 1 Campbell, 6' Hr. 3/16". Phinon cutter, No. 2/ Soan & Chase, capacity 1st 7. Phen machine, 8' Morgan, 6-track, m. d. 1' Phinon cutter, No. 2/ Soan & Chase, capacity 1st 7. Phen machine, 8' Milliams "Rapiduction", m. d. Pipe machine, 8' Millians "Rapiduction", m. d. Pipe machine, 8' Millians "Rapiduction", m. d. Pipe machine, 8' Willians "Standard", m. d. Pipe machine, 8' Willians, 1 d. d. Petas, arbor, 42' Weaver, hand. Press, arbor, 42'' Weaver, hand. Press, sob. L. Lewthwaite, wt. 460 lb., (4). Press, horn, No. 16½ Bliss, plain, stroke 1½", Press, ob. i., bench, No. 100 B Perkins. Press, OBI, No. 4 L. J., 3'' stroke, plain. Press, ob. i., No. 1 Thomas, 2'' stroke, m. d. Press, punch type, equal 3½ Bliss, 10,000 lb. Press, spic, crank, 59½ Toledo, str. 8'', m. d. Press, punch str., comb., No. 5 Buffalo, hand. cap. 3'' xã''. Punch & shear, S. E., 6'' th., No. 3 L. & A., rapida. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, No. 5-A., high speed, cap. 9', m. d. Riveter, Shaper, 18" Blount, single geared.
Shaper, 18" G. & E. motor 3/69/22 (old).
Shaper, 18" G. & E. motor 3/69/22 (old).
Shaper, 28" G. & E. motor 3/69/22 (old).
Shaper, 28" G. & E., B. G. crank, cone.
Shaper, 28" G. & E., B. G. crank, cone.
Shaper, 28" Columbia B. g. crank, gear box, s. p. d.
Shaper, 28" Columbia B. g. crank, gear box, s. p. d.
Shaper, 28" N. a Sinited, 28" blode, cap. 32" sq., m. d.
Shear, Blote, cap 69" 28" m. d.
Shear, Blote, cap 69" 28" m. d.
Shear, Blote, a G. Shaper, 28" m. d.
Shear, rotory 3" throat, 42" belt.
Shear, rotory 3" throat, 42" belt.
Shear, a G. Shear, 6" Shear, 6" m. d.
Shear, 6" Shear, 6" Shear, 6" m. d.
Straightening rolls, Cleveland 60" 3" m. d.
Straightening rolls, Cleveland 60" 3" m. d.
Tapping machine, 4" pratt & Whitney, b. d.
Teating machine, 5" old b. Economy, hand power,
Tractographs, Airco No. 1, (4).
Transmission. Reeves No. 04 E. (new)
Turbies, 100 h. p. Westinghouse, 900 rev.
Turret lathe, 18" 4" Springfield, Fox Monitor.
Turret-screw machine, 1" x15" P. & W.
Upsetter, 14" Acme, all steel,
Welder, arc, 160 amps, a. c., (near new) (2).
Welder, arc, 280 amp, a. c., (near new)

#### FOR SALE BY

#### General Blower Company 401 N. Peoria St., Chicago, Ill.

BLOWERS-FANS-EXHAUSTERS. For Dust Collecting — Ventilating.
Oil and gas burners, cupolas, furnaces, etc.
Roots—Connersville and centrifugal blowers What are your blower requirements?

#### Failor-Strafer Machinery Co. 132 Liberty St., - New York, N. Y.

132 Liberty St., - New York, N. Y. Automatic, 54" Model A Cleveland, motor drive. Blue print machine, Paragon, type B, size \$2, m. d. Boring mill, 5" her, D. & H., horts, floor type. Drills, 3" and 34" Cincimnati-Bioping or type. Drills, 4" and 34" Cincimnati-Bioping attachment. Drill radial, No. 4 American, door opening a "xist". Grinder, Oliver 4 wheel wood tool grinder. Lathe, 25 x16" Walcott, 3 step cone, d. b. g. Lathe, 13" x5" Willard, 3 step cone, d. b. g. Lathe, 15" x6" Willard, 3 step cone, d. b. g. Lathes, Le Blond, 19", 21", hvy duty, 3 st. cone, d. b. g. Lathes, 15" x14" and 18" x16" Lodge & Shipleys. Lathe, 18" x5" American, modern, 3 step cone, d. b. g. Lathes, 25" x44" and 3" x3" J. & L., bar equip. Fipe machines, 8" Wieland, 4" Williams, m. d. Shears, squaring 12" x3/16" Ohl.
Shear, squaring 10" x3/16" Loy & Nawrath, arr. m. d.

#### FOR SALE BY

#### C. C. Howarth Machinery Company 1440-1444 Franklin St., Detroit, Mich.

DESIRABLE MACHINES ON OUR FLOOR DESIRABLE MACHINES ON OUR F Lathe, 1426 Hendey. Lathe, 20x10 Monarch, cone drive, Miller, No. 3 Van Norman, m. d. Miller, No. 20 Van Norman, m. d. Shaper, 40° G. & E. m. d. Shaper, 10° Rockford, b. d. Shaper, 10° American, m. d. Slotter, Garvin 4° stroke.—And many others. Send us your inquiries.

#### L. L. Richards Machinery Co. 3804 N. Fratney St. Milwaukee, Wis.

| Arbor press, No. 5 Greenerd, power driven      | 175  |
|--|------|
| Drill, 2-spindle Kern, t. a. rebuilt           | 250  |
| Lathe, 18"x8' Le Blond, q. c. g., m. d.        |      |
| Planer, 30x30x10' Cleveland openside, one head | 1650 |
| Radial, 6' Bickford, gear box, s. p. d.        | 1000 |
| Saw, 6" Racine, cab. base, rebuilt             | 100  |
| Shaper, 16" American, b. g.                    | 350  |
| Threading machine, Bridgeport automatic        | 750  |

#### West Penn Machinery Company

West Penn Machinery Company
Air compressors, 30 to 2500 cubic feet.
Baing press, 22-P., Loogeman, m. d.
Air compr. portable gas I-R 180 cu. ft.
Blower, No, 4 Roots, capacity 2110c. f. m.
Bolt cutter, 1" Landis, double head, b. d.
Bolt threaders, automatic, Landis 4", m. d.
Bolt threaders, automatic, Landis 4", m. d.
Boring mill, 42" Bullard, 2 heads.
Bulldozers, Nos. 2, 4, 6, 9, 28, & 30.
Brake, 10"-14 ga., D. & K., hand.
Crusher, 3aw, No. 4 Chiampion, b. d.
Draw bench, 30,000 lbs. W. F., 22" draw., m. d.
Drill, radial, 24, Fosdick, a, p. d.
Drill, radial, 24, Fosdick, a, p. d.
Drill, radial, 24, Fosdick, a, p. d.
Drills, apright 16" to 36".
Engine, gas, 30 horse power Bessemer. 

#### 1210 House Building. Pittsburgh, Pa.

Threading machine, 1978a, 1979a, Pittsburgh, Pa.

Planer, openside, 48"x18" 14' D. & H., m. d.

Press, forging, 159 ton United, steam byd.

Press, hydraulic 100-ton Southwark.

Presses, O. Bl., No. 19 Blins & No. 4 Niagara, 2" str.

Press, 6 OBI, No. 19 Blins & No. 4 Niagara, 2" str.

Press, 6 spindle, Waterbury-Farrell.

Press, arch, No. 30 Blins, roll feed, b.d.

Pumps, centrifugal 6" 4" 1" motor drive.

Punch, comb., No. 12 Badger, 4" -1 19" round,

Punch, EF Cleveland, 38" throat, 19" thra 1".

Punch, BF Cleveland, 38" throat, 19" thra 1".

Punch, and title, 25 W. & W. 10" 220/3/60.

Riveters, air, hammer, minning.

Rolling mill, cold 5" 18" motor drive.

Saw, cold, 48" Newtoon motor drive.

Saw, cold, 48" Newtoon motor drive.

Shaars, alligator, 14", 7", 3" 4" 6".

Shear, Angle & Satt Long & Allstatter, m. d.

Shear, Niagara 42" 19 ga., belt drive.

Shear, Niagara 42" 19 ga., belt drive.

Shear, Stoll 60" 32/16", motor drive.

Shear, Sid ga. Odi. m. d., 110/220/160.

Shear, Girle, Niagara, 6": 18 ga., b. d.

Shear, Girle, Niagara, 6": 18 ga., b. d.

Shear, Girle, Niagara, 6": 10 ga., b. d.

Shear, Girle, Niagara, 6": 10 ga., b. d.

Shear, Girle, No. 3 Bliss, 40" 20 gauge.

Shear, Girle, No. 5 H. & J., 44" rd., m. d.

Shear, plate, 90" x9" Toledo, m. d.

Shear, plate, 90" x9" Toled

#### FOR SALE BY

#### The Elyria Belting & Machinery Co. Ohio Elvria

A BARGAIN ONCE IN A LIFETIME Unbreakable New Machinists' Vises. Made entirely of drop-forged steel. Only a limited number left.

3" stationary \$4.50. 4\$" stationary \$6.75. 5" stationary \$7.50. 3" swivel \$5.50. 48" swivel \$7.75.

Write for circular,

#### SPECIAL BARGAINS FOR OUICK SALE

Planer, Gray, 2 heads on rail, 20' bed, 36x36' table,

Lathe, Bridgeford, 28"x12',

Lathe, Bringetion, 30 and 31 and 42 and 48" gap, Harrington, 15' between centers with raising blocks.
Milling machine, No. 14, Cincinnati, with bracket for notor drive,

with bracket for motor drive,
Milling machine, No. 2 Le Blond, 3-step
cone head drive.
Planer, Hamilton, 26x26"x5
bed. I head on cross rail,
Radial drill, Muller, 4", m. d., with
tapping attachment.
Boring mill, Rogers, 30" vertical,
swing approx. 36"—pulley drive.
Wire straighteners, Wells, cap. 1/8"-31",
Structure of the straight (cut-offs can be extended to 30 ft.)

**GLOBE MACHINERY COMPANY** Chicago, Ill. 602 W. Lake St.

#### FOR SALE BY

Davis Machinery Company 1-3-5 So. St. Clair St. Toledo, Ohio

Brake, 4'x3/16" Chicago, power, leaf type, m. d. Gear cutter, 36-B G. & E. automatic gear. Grinder, Union Hob, motor driven, Lathe, 26"x16' Rahn Larmon, q. c. g. Mill, No. 34 Ohio by, duty, plain, rajid trav, Mill, No. 2B. & S. vertical, c. p. Mill, No. 1 Kempsmith univ..comp c. p. Press, No. 54-S Toledo s. s. gd., 8" stroke, Press, 86 ton H. & W., dieing machine, m. d. Serew, machine, 3" Gridley Model G automatic.

#### FOR SALE -GOOD TOOLS

Automatics, B. & S., No. 00, Ser. 6805 \$750.
Automatics, Gridley, 1¾4, model "F'. 4-apin-dle Automatics, Gridley, 1¾4, model "F'. 4-apin-dle Automatic, Ser. 6286.
Lathe, 1¾7, 15½ & 16½ & 64, q. c., m. d. with motors.
50° Bullard Rapid Production Boring Mill. 2 swivel heads on rail. Serial 5495.
51,500.
Drill, Barnes 34°, Sid. Hd., Tap. Att. \$275.
Lathe, No. 4 Stark, Bench. ¼4.
Lathe, No. 4 Stark, Bench. ¼4.
Lathe, 1½86° Carroll-J, S.Q.C. Fair. \$125.
Broach, No. 1 LaPoint for castallating \$200.
Miller, No. 2, Craftaman Rotary.
750.
Miller, No. 2, Craftaman Rotary.
7750.
Ironworker, No. ½ Buffalo, Univer. \$1000.
Tapper, ¼\* Hart-Hageman, Auto... \$250.
Flame Gut., Hancock 01, 1818, Gas. \$200.
BANSBACH MACCHINERY CORP. BANSBACH MACHINERY CORP. 3845 West Madison Street.



If you want to SELL IT ... TELL IT to the Blue Book Readers!

## AN EXCELLENT BUY





## 10 ft. Pond Vertical **Boring Mill**

With 2 swivel heads and one center spindle; diameter of table 96"; maximum distance table to rail 60": belt drive, power feed.

In Very Good Working Condition \*

## H. H. PELZ

5140 Woodlawn Ave.

Chicago, III.

VERTICAL BORING MILLS 10'-16' Niles Exten. Type; 2 sw. hds.; M.D. 44" N.B-P Hay. Duty; 2 swi. hds.; Power Rapid Traverse; M.D. 48" Colbur; 2 swivel heads; S.P.D.

#### MILLING MACHINES

No. 4 Cinc. Pl.; Power Rapid Trav.; M.D. No. 2 Cincinnati Vertical; M.D. No. 15 Garvin Vertical; M.D. No. 3 Cincinnati Plain; B.D. 24" Cincinnati Duplex; M.D. No. 3 Davis Thompson Rotary Mill; M.D.

#### LATHES

36"x20" L. & S. 18-sp. Selective Hd.; M.D. 30"x17" Houston, Stanwood & Gamble; B.D. 16"x10' American; B.D.

#### GRINDERS

12"x36" Landis Plain; M.D. 12" Heald Rotary Surface
No. 1 Brown & Sharpe Univ.
No. 3 Abrasive Surf.; Motor in Base
No. 24 Gardner Horiz. Disc; 53" dia.
No. 14 Gardner Disc; 20" dia.
No. 8 Badger Disc; 28" dia.

#### **PLANERS**

36"x36"x20' Chandler; 4 heads; M.D. 18' Hilles & Jones Plate; 34" cap. TURRET LATHES

3"x36" Jones & Lamson; S.P.D. 2"x24" Jones & Lamson; S.P.D

#### AUTOMATIC SCREW MACHINES 11/4"-11/2" Cleveland Model "A"; M.D. "Gridley Model "G" 4-spindle; M.D.

DRILL PRESSES

4-spindle & 1-spindle Avey; M.D. 2-spindle & 1-spindle Leland Gifford; M.D. 4-spindle Edlund; M.D. 8-spindle Natco Multiple

#### SHEARS

No. 3 Long & Allstatter; 24" throat; 100" blade; 14" cap.; M.D. SHAPERS & SLOTTERS

24" Gould & Eberhardt; M.D. 16" Gould & Eberhardt; B.D.

#### MISCELLANEOUS

HAMMER, 300-lb. Bradley Helve RIVETER hydrau., 150-ton Chamb.; 6" str. ROLLS Wickes; vertical type; cap. 12'x 1½"; largest roll 23" dia.; 2 smaller rolls 17" dia.

MACHINERY COMPA

## CONSIDER GOOD USED EQUIPMENT FIRST

#### IMMEDIATE AVAILABILITY AND DELIVERY ARE IMPORTANT FACTORS 40'x6"

Logemann Model 13P Horiz, Hy. Box 58"x22"x16", Size of Size of Bale 10"x16"x10" BENDING ROLLS

BENDING ROLLS

10' Bertsch Initial Type, Motor
Driven Camedy 1' Plator
Driven Camedy 1' Plator
Driven MD Capacity 1''
20' Niles, MD, Capacity 1''
20' Niles, MD, Capacity 1''
20' Niles, MD, Capacity 1''
BORING MILL—HORIZ.
8'' bar Barrett Cyl. Bor B.M.D.
BORING MILL—VERTICAL
42'' King, M.D. Equiped with
5. Station Turret Hd. & Plain
Bail Head Power Ramid Tya-

Rail Head Power Rapid Traverse

il Head. Power Rapid Tra-se in all directions. King, M.D. Equipped with to Plain Rail Heads. Power Two

Two Plain Rail Heads. Power Rapid Traverse in all directions BRAKE—LEAF TYPE
6° D.&K. "Chicago" No. 167
Motor Driven. Capacity 2"
BRAKES—PRESS TYPE
6° Dreis Krump, M.D., Cap. 2"
8°6° Loy & Naw., M. Dr. Cap.
No. 10 Ga.

BULLDOZERS

50. 7 Ajax, M.D. face of cro head 12"x76" Stroke 16" 0. 7 Williams & White, M.I. Face of Crosshead 16"x70' Stroke 22" face of cross troke 16" M.D.

CRANES OVERHEAD ELEC-

5 ton Bedford 35' 6" Span, 229/3/60 AC 226/3/60 AC 10 ton North. 49' Sp. 220VDC 10 ton American 59'10" Span, 220/3/60 AC 9 ton Northern 66' 9" Span, 440/3/60 AC Champion 85'11" Span. ton

10 ton Champion 85'11" Span, 440'3',60 AC 20 ton Morgan 50' Span, 220 Volt DC 5 ton Auxiliary 20 ton Morgan 62' Span, 230 Volt DC 10 ton Auxiliary CRANE—GANTRY 4 ton Link Belt. 100' Span 229 4 ton Link Belt. 100' Span 220

4 ton Link Relt. 100' Span 220 /3/60 A.C. With 2 Yd. Wil-liams Clam Bucket FLANGING MACHINE 1" McCabe Pneumatic Flanging

FORGING MACHINES 3" to 7" Ajax, Nat. Acme, St. Fr. FURNACES

9000 lb. Swindell Electric Melt-ing Furnace Complete with 1800 KVA 22,000/3/60 Trans. 10 ton No. 5 Heroult Slag Melt-ing Furnace Complete with 7500 KVA 11,000/3/60 Transformers (New) Transformers (New)
HAMMERS—BOARD DROP—
STEAM DROP—STEAM FORG
STEAM DROP—STEAM FORG

1000 lb. to 8000 lb Chamb., & Sp. Erie, N.B.P Morgan JOGGLING MACHINE M.D. Cap. 2 Morgan Plate, M.D. Cap. ioggle #" Plate 42" f. edge

6500 lb

ERIE BOARD DROP

HILLES & JONES
PLATE EDGE PLANER
Capacity 1-1" Plate
Motor Drive

6000 lb. CHAMBERSBURG STEAM FORGING HAMMER Double Frame-Guided Ram Type

LATHE

ew Haven Lathe, M tween Centers 72" 10" Raising Block M.D. 21' Be-Swing, with

10" Haising Block
ATHES—AXLE
1"x13'6" Putnam Hvy. Duty,
M.D. 102" Distance bet. Cent.
60, 3 N-B-P Dbl. Axle Lathe,
Hvy. Duty. M.D. 111" Dis-

LATHE—ROLL

44" Hyde Park Dble, Roll Lathe,
M.D. 33' Bed, head stock at
each end, 22' betw. centers.

each end, 22 betw. centers. PLANERS 48"x48"x16' Cinc. 2HD., MD. 60"x52"x22' Lib. 3 Hd., M.D. 72"x48"x16' Gray Four Head, M.D

I.D. (New) 'x60"x31' Pond 2-Head,B.D. D"x84"x25' P'd 4-Hd.,B.M.D. 100"x84"x25' P'd 4-Hd.,B.M.D. PLANER—OPENSIDE 48"x48"x16' D.&H. 3 H.,BMD

PRESSES-HYDRAULIC RESSES—HYDRAULIC 00 in Chambersb. Self-Cont. 4 Col. Hydro-Pneu. P. 12" Dia. of Ram. 18" Str. 49" Bet. C. 000 ton Wood Four Col. Forg. Press, 36" Dia. of Ram. 24" Str. 22"x41" Betw. Columns RESS—STRAIGHT SIDE 0. 90F Toledo Double Crank, 12" Str. 124" Bet. Uprights 3000 ton Woo Press, 36" I Str., 22"x41

PRESS

PRESENT 124" Bet. 12" Str. 124" Bet. 12" Str. 124" Bet. 12" Str. 124" Bet. 12" Str. 12" Str.

to punch plate; shr, 8" chan or I-ucanoplate; shr, 9" chan or I-ucanoplate; shr, 8" chan or I-ucanoplate; shr, 9" chan or I-uc

PUNCH & SHEAR COMBINA-

End, a. thrul

1½" with Lysholm Table Type G Clev. Sgle. End. Arr. for M.D. 12" Throat. Cap. Punch 2" thru 1". Lysholm Double End. M.D. 44" Thrts. Cap. 1½" thru ½" Steel ROLL-PLATE STRAIGHTEN. 96" Newbold. Arr. for M.D. Nine 14" Dia. Rolls. Ca-Arr. End, M.D. 44"

Arr. Rolls. Capacity 1-1" Plate

ROLLING MILLS

9" Belgian Bar Mill, Consisting of two 3 high roughing stands 12"x54"; finishing stand 2 stands 2 high 9" x 13", 3 stands 3 high 9", x 13", 3 stands 3 high 9", x 30" 10x9" Acme Four Stand 2 High 10,"x12" UE&F Sql. 8t. 2 Hi. 14"x42" Gar. Sgl. Stand. 2 Hi. 16"x20" Nat. F. Sgl. Stand. 2 Hi. 16"x20" Nat. F. Sgl. Std. 2 Hi. 22"x28" Univ. 3 High Mill complete install, incl. motor 19" Morgan 8 Stand Contin. Sheet Bar and Skelo Mill with

9" Morgan 8 Stand Contin. Sheet Bar and Skelp Mill with 3 Stands of Vertical Rolls 4" Mackintosh Merch. Bar Mill. One 3 High Stands. One 2

One 3 High Stands. One 2 High Bull Head Stand 30" Morgan 3 High Bill. Mill 4" Bloom. Mill. Consist Pin-ion Stand, Rol. Tbl. & CatchT. SAW

Wellman Seaver Hot Saw, for M.D. T2" Dia, Saw, pacity 114" Sq. Billets SHEARS—ANGLE 4"7.4"x3" L. & A. Dbl Ai Shear Arr. motor drive 6"6"6"3" Hilles & J. No. Dbl. Angle Shear, Arr. & Sw. S"x1" L. & A. Size C I Angle Shear, Motor Driven Angle Shear, Motor Driven SheARS—BAR Seaver Start Day Dbl Angle

MEARS—BAR

0. 3 Hilles & Jones Guill. Type,
Arr. for M.D. Cap. Shear 3"
Round, 2-4" Square, 10"x14"
Flats 6"x6"x2" Angles
0. 10 Buffalo Armor Plate,
Belt or M.D. Cap. shear 3-5"
Rounds, 3. "Squares, 8"x14"
Flats, 8"x8" x4" Angles
4" UE&F Co Bar Shear, Arr.
4" UE&F Co Bar Shear, Arr. Flats, 877
74" UE&F
for M.D.
1-1" Bars

74" UE&F Co Bar Shear, Arr. for M.D. Capacity eight 8"x 1-1" Bars. Complete with 70" Bar Shear Approach Table Mesta Vertical Open Throat Bar Shear, M.D. 1-1"x36" Cap. to cut four 1-1"x8" Cold Soft Steel Sheet Bars. Complete Tables

with Tables
SHEARS—GAYE
84" Newbold, M.D. Cap. 1" Pl.
84" Newbold, M.D. Cap. 2" Pl.
132" Morgan, 7;" Stroke, Capacity 1-1" Plate
12" Beatry Mche. Mfg. Co. M.
D. Cap. 1" Plate
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No. 40A, Unickwith Rot. Shear,
Comp. 4" Plate
Comp. 4" Plate
Comp. 4" Cap. 4" Plate
Comp. 4" Plate
SHEAR—ROTARY FILING
Inited Engr. 4 Fdry, Co. M.D.
1" Rds. up to 2"x3" Flats
SHEAR—SQUARING

1" Rds. up to 2"x3" Flats SHEAR—SQUARING 96" Rliss No. 465, M.D. 4" Pl. STRAIGHTENERS 2" Hallden No. 2 String & Cub-off Mch. Arr. M.D. 12" Cut M.D. "Physics Senting A. Caracter, D." "Physics Senting A. Caracter, D." off Mch., Arr. M.D. 12 Cut-out.
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Cap. Solid Bars 11 to 4.5 C.D.
Dia Tables, 11 to 4.5 C.D.
31 "S1 "C. 1" to 4.5 C.D.
31 "S1 "S1 "S "Shuster Rot.

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|-----|-------------------|-------------------|---------------------|--------------------|------------------|
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Bliss Consolidated No. 3, 4, 5, m.d.

Shapers 16" Ohio 20" Cincin, Shaper, back grd. 24" Stockbridge. Shears

52", 14 ga. Niagara, b.d. 8', 14" Toledo, b.d. 10' %" Pexto Gap Frame Lathe Type, m.d.&m. 10', 16 ga. Streine Shear.

Upsetters 1" National, Steel Bed. 1½" Acme, steel bed, m.d. Welders Wolders
175 KVA Thomson Projection (2).
Federal, 125 KVA, M.D.
200 KW Federal Projection Spot.
150 KVA Thompson Butt Welder.
Spot, Taylor Winfield Automatic, 20-27 KVA (6), motor driven, late type.
Taylor Winfield, National, Federal m.d. Butt

(12)(12)
Taylor Winfield 4 way Flash Welder m.d.
Taylor Winfield, Federal Thomson Spot (34).
Taylor Winfield Gun Type, Portable.

Miscellaneous Balancer, 18" Gisholt Static, Vert. Boltcut., 2 sp., 34" cap., Landis, Id. scr. Bolt Threader, 2 spindle No. 3 Manville Broach, No. 4 Lapointe. Broach, V-18 American. ld. scr. att. Chip Separator, McKenzie, M.D. Die Sinker, No. 2 Pratt & Whitney Lift Trucks, Baker high lift, Automatic low

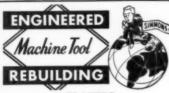
Lift Trucks, Boase, lift, 3-ton, 16tt, 3-ton Rivet Heaters, Berwick (4). Slotter, 20" Sellers, b.m.d. 18" Gisholt Static Balancer, arr. m.d., with

4-speed head.
Threader, No. 3 Manville, Dbl. spin., Auto
Hopper Feeds. Wire straightener, %" Shuster, MDM.

AND A COMPLETE STOCK OF FINE UP-TO-DATE EQUIPMENT

## HARVEY GOLDMAN AND CO.

10571 GRATIOT AVE. DETROIT, MICH.



PLANERS

92"x87"x42' N-B-P, Revers. Mtr. Dr. 60"x48"x16' D & H Openside 36"x36"x16' Cleveland Openside 48"x48"x16' Detrick-Harvey Opens.

48" Newton Rotary Planer BORING MILLS

96" N-B-P Vertical Boring Mill 120" N-B-P Vertical Boring Mill 24" Bullard, Rapid Production 33/4 Bar P & H Drilling, Boring Mill GRINDERS

No. 4 Landis Univ. crankshaft attach.

Universal Tool & Cutter Grinders Pratt-Whitney contour cutter Gisholt Universal Tool Grinders 40"x20' Landis Cyl. Grinder, pl. m.d. LATHES

24"x14' Reed Prent. GH, M.D., Tap. 30"x13' H.S.G. Heavy Cone Drive 32"x16' Bridgeford, Geared H., M.D. 32"x18' Bridgeford Grd. Hd., S.P.D. 26/40x20 McCabe, Double Spindle 42"x22' N-B-P, Grd. Hd., M.D., Tap. 42"x22' Bridgeford, Grd. Hd, M.D. 60"x40' Wright, two carriages, M.D. 90" N-B-P Driving Wheel, double quarter., Seneca Falls Short Cut

MILLERS No. 24 B & S Sliding Head, Plain No. 2 Garvin Duplex No. 14 Cochrane Bly, slot. hd., M.D. 3B Milwaukee Vertical, M.D. 6x48 & 6x80 P & W Thread Miller

48" N-B-P Rotary End Miller

## SIMMONS MACHINE TOOL CORP.

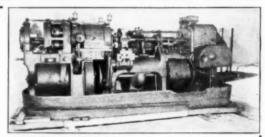
1725 Broadway, Albany, N. Y. Singer Bldg., New York City

### GOOD MACHINES

3" Model "B" National Acme Automatic, spindle.

3?" Model "B" Na-tional Acme Automatic, 4-spindle.

Automatics
No. 00G, No. 0G, No. 00, No. 0, No. 2's—
All Sizes, Full Automatics and Turret



#### MISCELL ANEOUS:

1-24" Cincinnati Duplex Auto. Mill with

53" disc -Hutto 2-spindle Internal Honing Machine

1-No. 24 Gardner Horizontal Disc Grinder, 1-No. 1B Cleveland S.E.Punch-36" throat 1-1;" Acme Upsetting & Heading Machine -steel head M.D.

-8"x8"x1" Kling Double Angle Shear M. D., on turntable 1-11' x 16 Ga. Stoll Square Shear

6—6-A Potter & Johnston Lathes 3—Crankshaft Lathes—Lodge & Shipleys

50-Drills of all sizes

These are but a few of the many items we have in stock.

RIVERSIDE MACHINERY DEPOT, 255 St. Aubin Ave., Detroit, Mich.

#### MILES QUALITY TOOLS

AUTOMATICS 1" & 1-% " New Brit. 6 spindle 1" & 1-%" New Brit is spingle
I" Cleveland Mod. J. dbl. and
114", 1-34", 2-%" & 314"Grid.
114" & 112" Cone 4 spindle
1-%", 2" & 214" Not. Acme
Nos. 24, 33, 454 & 654 New
Reterms churcking Britain chucking 8" Gisholt Simplimatics

BROACHES

Nos. 1, 3 &4 Lapointe screw Twin 10 & No. 3 Oilgear hydr. No. 2S Lapointe hydraulic 10 ton Metalwood vert. hydr. 2 ton American vert. No. 3 J. N. Lapointe double

DRILLS

21", 24", 28" Cincinnati 21", 25", 28" Superior 30" Snyder 20" & 24" Barnes all geared Nos. 121, 217, 314, 315, 321

Baker
No. 2 Colburn, 1, 2, 3, 4, spdl.
24", No. 4 Colburn
15", No. 2 Avey, 1, 2, 3 spdl.
24", No. 3 Avey, 1, 6, 2 spdl.
16" Fosdick, 1, 2, 4, 6, 6 spdl.
Nos. 11, 12, 13, 14, 6, 30 Natcomult. 8 to 48 spdls.
3½', 4', 5', 6', 6' Western radial
4' Mueller radial
6' N. B. P. univ. radial
No. 15½ Foote Burt Mfg.
FORGING MACHINERY Baker

No. 151/2 Foote Burt Mig. FORGING MACHINERY

", 2", 21/2" upsetters 1/6" Acme upsetter
No. 1A Ajax forging rolls
No. 3B Nozel hammers
400 & 600 lb. Chambersburg
board drop hammers

%" No. 3 Manville header Nos. 25 & 9 W. & W. bulldzrs.

GEAR CUTTERS Nos. 12HS, 18H, & 24HS G.&E. Nos. 1 & 5A Lees Bradner No. 12 Barber Colman 48", No. 4 Brown & Sharpe 28" & 36" G & E automatic Nos. 2 & 2½ Bilton auto. Lipe 2 spdl. chamferers 15" Cleans Gleason quenching press

GRINDERS 6"x18", 10"x5 x72" Landis 10"x52", 12"x36", 12" x72" Landis 6"x32", 10"x36", 10"x50", 14" x50" 6 14"x72" Norton 12"x24" Modern 12"x40" No. 3 B. & S. univ. 12"x36" No. 2½ Bath univ. No. 2 Norton tool & cutter No. 2 Compiled tool & cut. Nos. 6 & 10A Bryant Internal No. 70 Heald Internal 18", 24", 30" & 53" Gard, disc

Gardner semi-automatic No. 96 Gardner hydraulic fd. No. 84 Gardner, 24" opp. disc No. 221 Badger, 24" opp. disc 2½" Wilmarth & Morman drill 214" Wilmarth & Morman arıı 1142" & 3" Oliver drill 26" 6 36" Blanch. rot. surf. 12"x24" & 12"x36" Diam. sur. 16"x50" Safety Emery surface 14" Pratt & Whitney BB sur. 12", No. 22 Heald rotary 8" & 12" Arter rotary 8" Arter auto. fd. piston ring Pratt & Whitney worm grind. National Tool Co. worm grd. 24" Ingersoll milling cutter

No. 524 Mummert Dixon rad. Osterholm resurfacing grds. 10"x50" Norton cam 10"x27" Bath spline Gisholt tool Diamond face & edge 84"

ENGINE LATHES 10"x5" Pratt & 12"x6" Monarch 13"x6" Willard Whitney

13"x4" & 13"x5" South Bend 14"x6" Monarch 14"x6" Lodge & Shipley 14"x6" Walcott 15"x6" South Bend

15"x6 South Bend 16"x6' Monarch 16"x6' Hendey 16"x6' Cincinnati 16"x9' Lehmann

6 4" Ajax 16"x10 Leblond 18"x8' L. & S. grd. hd. 16"x10' Leblond

18"x9" Chard 20"x8" Monarch 20"x10" Morris 21"x18" Leblond 22"x10" Davis geared head

22"x12" Morris geared head 23"x10" Rahn Larmon

24"x10" LeBlond 24"x10" Boye & Emmes 24"x12" Lodge & Shipley 24"x16" Boye & Emmes 26"x12" Wickes

26"x12" Wickes
26"x15" American geared hd.
30"x12" Lodge & Shipley
TURRET LATHES
Nos. 2. 4 & 3A War. Swasey
No. 4 Cincinnati Acme
Nos. 3 & 4 Foster
21" Gisholt 21 GISROII
3"x36" Jones & Lamson
Jones & Lamson 2 spindle
No. 4 Bardons & Oliver
21/4"x26" Greenlee
21/2"x26" Pratt & Whitney

MILLS, BORING
42" Bullard, MD, PRT
42" Detrick & Harv. MD, PRT
3" Binsee horizontal

MILLERS

Nos. 3 &4 Cincinnati vertical Nos. 5C & 6 Becker vertical Nos. 5C & 6 Becker vertical Nos. 2, 3 & 3S Cincinnati Nos. 2 & 3 Kempsmith Nos. 1½B & 2B Milwaukee No. 2 Heavy Brown & Sharpe No. 2 Rockford No. 4 Leblond No. 6 National Transit No. 35 Ohio universal
6"x14" Pratt & Whitney thrd.
24" Cincinnati duplex auto.
48" Cincinnati automatic No. 3 Rockford Rigidmil No. 3 Rockford Rigidmil
No. 31 DeVlieg Supermill
No. 21 Brown & Sharpe auto.
36" & 42" Ingersoll cont. rot.
Model C Becker rotary
48" Ohio tilted offset
28", 37" & 42" Briggs
Nos. 1 & 1A Davis & Thomp.
Type 45 Bilton Productomatic
No. 1 American, Lincoln type

PLANERS 24"x24"x8" Rockford 30"x30"x8" Gray 32"x32"x12" Niles 36"x36"x10" Det. & Hy. opens. 36"x36"x16" Cleveland open. 56"x56"x16" Gray

16" & 24" HAPERS
16" & 24" Gould & Eberhardt
16" Kelly
16" Ohio, 20" & 28" Ohio
16", 20" & 24" Walcott
20" Smith & Mills
24"x24" Cinc. shaper planer
24" Columbia

24" Columbia 24" Milwaukee 36" Morton draw out

SHEARS 36"x16 ga. No. 536 Niagara 42"x22 ga. Niagara foot 48"x14 ga. No. UD4 48"x3/16", No. 748 72"x3/16", No. 872 96"x3/16", No. 796 UD48 Pexto Niagara Niagara Niagara 120"x16 ga. Bertsch No. 15 Niagara rotary 30", No. 14 Pettingell rotary 34", No. 1 Gray metal cutter

TAPPERS Nos. 1, 2, 2X, 2BG Garvin No. 3 Holnes 6 spdl. tilted Hammond pedestal & radial Natco 1 & 2 way lead screw

THREADERS THREADERS

1/2", 1", 1/2" 6 2" Landis dbl.
1/2" Acnie double
1/2" Webster & Perks double
1", 2" & 21/2" Landis single
11/2" Geometric single
2" & 3" Acme single

PARTIAL LIST ONLY. SEND US YOUR INQUIRIES.

MILES MACHINERY CO., SAGINAW, MICH.

## **EMCO REBUILT**

35" Bullard New Era, m.d., 1 rail head, I side head, late type Gisholt, cone, 1 rail head Gisnol, cone, i rain neda 42" Gisholt, gear box, 2 heads, p.r.t., late 42" Gisholt, gear box, 2 heads 42" King, m.d., 2 rl., l side hd., p.r.t.late 48" Niles-Bement-P. Car Wheel Borer, belt 2.72" Cinc. Rap. Prod., m.d., 2 rl. hds.,p.r.t. 90" Niles-Bement-F. Car Wheel Borer, belt 2-72" Cinc. Rap. Prod., m.d., 2 rl. hds.,p.rt. 10' Niles, cone, 2 heads, old type No. 4 Niles-B-P. Horiz., m.d., 5½" bar No. 40 Landis Fl. Type Horiz., 4" bar.m.d. Niles-B-P. Cyl. Borer, m.d., 12" main bar 42" King, 1 swivel, 1 turret head on rail

PLANERS

PLANERS

Morton Traveling Head, m.d., 48" stroke 24" Cincinnati Crank, m.d., 1 head 24"x24"x6' Ohio, helt, 1 head 24"x24"x6' Smith 6 Silk, m.d., 1 head 30"x30"x8' Pond, belt, 1 head 30"x30"x8' Gray, m.d., 2 heads 32"x32"x8' Gray, belt, 1 head 36"x30"x12' Gray m.d., 3 heads 36"xx8' in 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36" xx8' to 42"x12' Cinc. rav m.d., 3 heads 36"x12' Cinc. rav m.d., 3 36"x36"x10" Niles, revers. m.d., 3 heads 36" wid. to 42"x12" Cinc., rev. m.d., 3 hds. 36"x36"x12" Niles, m.d., 4 heads 39"x39"x10" Cinc. Forge Type, belt, 2 hds. 54"x40"x12" Clark 39"x39"x10" Cinc. Forge Type, bett, 2 hads. 54"x42"x12" Gray, revers. m.d., 4 heads. 55"x55"x30" Betts, revers. m.d., 2 heads. 36"x36"x8" Cincinnati, belt 2 heads.

#### MILLING MACHINES

MILLING MACHINES

No. 3 Cinc. Vert. Dial, m.d. in base,
Timk. Bear., Nat. Std. Spdl., very late
No. 3. 4 Cinc. Vert. m.d., flanged spdl.
No. 2A, 4B, SC, 6 Becker Vertical, cone
No. 3 Cinc. Univ. s. p.d., flanged spdl.
No. 2 Cleveland Plain, s. p.d.
No. 2H Brown & Sharpe Plain, cone
No. 2 Cincinnati Plain, cone
No. 3 Versenvith Plain, cone No. 3 Kempsmith Plain, cone No. 4 Cincinnati Plain, cone No. 4 Cincinnati Plain, cone No. 13B Brown & Sharpe, s.p.d. No. 13B Brown & Sharpe, s.p.u. 48" Cinc. Worm Dr. Plain Automatic, m.d. 48" Cesterlein Tilt, Offset, m.d., Timk. Br. No. 4—36" Cincinnati Plain Hydromatic, o. 4-36" Cincinnati m.d. in base, late type m.d. in base, late type m.d. very late m.d. in base, rate type No. 56—108 Cincinnati Plain Hydromatic, with 3 vertical spindles, m.d., very late 24" Cincinnati Plain Automatic, m.d. 24" Cincinnati Duplex Automatic, belt 36"x36"x8' Ingersoll Comb. Vertical and Horizontal, adjustable rail type C66A Newton 3 spindle Continuous, s.p.d.

#### GEARED HEAD ENGINE LATHES

No. 6 Whitney Hand, belt

14"x6' Prentice 14"x10' Lodge & Shipley, 12 speed head 16"x8' American. 16"x10' American 16"x14' American. 18"x8' Americans

L. & S., 12 s. hd., taper, reliev. at. 16"x8" Reed

18"x8' Lodge & Shipley

18"x8" Lodge & Snipsey
18"x12" American, taper
18"x14", 18"x18", 20"x8" Americans
20"x12" American, 12 s. head, taper
20"x12" Lodge & Shipley, 12 s. head, taper
20"x13" Boye & Emmes, 12 s. head, taper
21"x16" LeBlond, 12 s. head, taper
24"x12" American, 24"x26 American, taper

24"x12" Monarch 24"x15" Reed

24"x18" Heea 24"x18" Lodge & Shipley Patent Head 27"x12" Betts-Bridgeford, taper 27"x18" Betts-Bridg. Oil Co., 10" hole, tap. 42" raised to 53"x39" Putnam, d.c. drive

CONE HEAD ENGINE LATHES

14"x6' Bradford 14"x6' Lodge & Shipley 14"'x8' American

15"x8' LeBlond. 16"x6' LeBlond 15"x8" Sidney

15"x8" Sidney 16"x6' Greaves-Klusman 16"x6' Pratt & Whitney 16"x7' P. & W. Tool Rm., tap. col. att. 16"x8' American. 16"x12' American

16"x7" P. a W. 16"x8" American. 16"x8 Cincinnati 16"x8" Monarch 16"x8" Rockford

18"x6' Monarch 18"x8" Hendey 18"x8" LeBlond

18"x8" Mueller
18"x8" Mueller
18"x10" Schumacher-Boye
18"x12" American. 20"x8" American
20"x10" Lodge & Shipley
21"x8" LeBlond, taper. 21"x10" Lel
24"x10" Bridgeford
24"x10" Canada Machinery Corp.

21"x10' LeBlond

24"x10" Canada Machinery Corp.
24"x11" Chard
24"x12" American. 24"x26" American
24"x12" Schumacher-Boye. 36"x10" Schu-B.
24"x12" S.B. 36"x10" Schumacher-Boye
24-48"x16" McCabe 2 in 1

24"x16' Schumacher-Boye 26"x12' Boye & Emmes

27"x16' Bridgeford 36"x18' Niles

#### TURRET LATHES

No. 3A Warner & Swasey Universal, m.d. No. 2, 4, 6, 8 Warner & Swasey, cone No. 4 Warner & Swasey Universal, cone No. 1 Warner & Swasey Universal, cone No. 3 Cincinnati Acme Universal, s.p.d. No. 3 Foster, cone No. 4, 7 Bardons 6 1" Biggs, cone 11'2x18", 2x24", 3x36" P.6W. Tur., cone

WE CARRY AN AVERAGE STOCK OF 1500

## THE EASTERN

1001 TENNESSEE AVENUE.

## MACHINE TOOLS

2 spdl. J.&L. Steel Hd., m.d., air chucks 3x36" Jones & Lamson, chucking, m.d. 2 spindle 3x36" J.&L., m.d., chucking 2 spindle 3x36" J.&L., m.d., chucking 31/4x36" Cincinnati Acme, m.d. 3/4x30 Cincinnati Acme, m.d.
16" Warner & Swassey Plain Turret, cone
18", 20" Acme Turret, cone
18" Type A Libby Turret, m.d.
26" Libby Type C, m.d., 7½" hole, taper
21", 24" Gisholt hole, taper

#### SHAPERS

10" Rhodes, Vertical 10" Alba, gear box, new 16" Steptoe, gear box 20" Queen City, cone 24" Barker, cone 24" Cincinnati, cone 24" Rockford, cone

28" Amer. gear box, vee ram ,auto oil

SURFACE GRINDERS 16-26" Blanchard, m.d. on spindle, No. 16-26" Blanchara, m.a. on 25 H.P. motor No. 25A Heald, m.d., 16" chuck No. 10U Norton Lapper, m.d. 12x36" Diamond Auto. Surface, 18x48" Diamond L.D. Face, m.d. 30x84" Diamond H.D. Face, m.d. 54" Bridgeport Knife, belt 60" Bridgeport Face, s.p.d. 6' Reed-Prentice Vertical, m.d. Syringfield Planer Type, m.d. m.d. Springfield Planer Type, m.d.

INTERNAL GRINDERS No. 3 Bryant Semi-Automatic Hole, m.d. No. 10 Bryant Semi-Automatic Hole, belt No. 11 Giddings & Lewis Teromatic, 3m.d.

UNIVERSAL GRINDERS

No. 1 Wilmarth & Morman, belt No. 2 Brown & Sharpe, belt No. 2 Landis, belt. 10x18" Lan 16x48" No. 3A Cincinnati, belt Landis, belt No. 13 Brown & Sharpe, belt No. 3 Gallmeyer & Livingston, m.d.

PLAIN CYLINDRICAL GRINDERS 6x18" Landis, m.d.

6x18" Landis, m.d.
6x30" Norton, m.d.
6x32" Brown & Sharpe No. 11
6x32" Norton, belt
7x72" No. 16 Brown & Sharpe, belt
10x18" No. 16 Brown & Sharpe, belt
10x18" No. 14 Brown & Sharpe, belt
10x36" Landis Integral Cam, m.d.
10x36", 10x52", 10x72" Landis, m.d.
10x36" Norton, m.d. 10x50' Norton, m.d.
12x36" Cinc. belt. 16x48" Cincinnati, belt 12x72" Landis, m.d. 12x72" Norton, belt

14x72" Norton, m.d. 16x52", 16x72", 20x144" Landis, m.d. TOOL & CUTTER GRINDERS
Gisholt Tool, belt

Gould & Eb. Gear Cutter Grinder, belt No. 1, 1½ Cincinnati, belt No. 1 LeBlond, two motor drive No. 1 Wilmarth & Morman, 3 motor drive

No. 1 Wilmarin & Morling, o Morlon, belt No. 2 Norton, belt No. 2 Lumsden Tub Type, belt No. 4, 5, 41 Oliver Drill Pointers,m.d.in b. No. 23 Brown & Sharpe Gear Cutter, belt Sellers Drill, m.d., 3" cap Gleason Cutter belt New Yankee Twist Drill, m.d. 18" Cincinnati Face Mill, m.d.

GEAR CUTTERS AND HOBBERS

No. 7 Fellows H.S., m.d.
No. 6, 61, 62, 612, 615 Fellows
Gleason Bevel Gear Tester, belt
6" Gleason Straight Tooth, belt
No. 1 Lees-Bradner Prod, Hobber, m.d. No. 1 Lees-Bradner Prod. Hobber, m.d.
No. 3, 12 Barber-Colman
No. 3-26" and 36" B. & S. Gear Cutters
No. 3 Heavy Brown & Sharpe, m.d.
No. 3-26" Cincinnati, belt
No. 5-6 Lees-Bradner, 14" size, belt
No. 6-60 & 6-72" B. & S. Gear Cut., m.d.
16" Cincinnati Gear Hobber, m.d.
36" Gould & Eberhardt Gear Cutter, sp.d.
Schuch. & Schutte Gear Tooth Rounder, blt.

PIPE MACHINES No.2 Bignall & Keeler, m.d., 2" cap. No. 4 Big. & K. m.d., 4" cap. 2" No. 70 Jarecki, m.d. 2" Landis Dbl. Head Pipe & Nipple, belt No. 4 " Merrell, m.d. 2" Saunders, m.d. 2" Eaton, Cole & Burnham, belt 8" Bignall & Keeler, belt

SQUARE SHEAR KL 101/2 Niag., m.d., cap. 10' by%",latest

RADIAL DRILLS 4', 5' Amer. Triple Purp., gear box on base 6' Amer. Triple Purpose, d.c. drive on arm American Sensitive, cone

3' American Sensitive, cone 3' Carlton Sensitive, belt 4' Amer. Triple Purpose, d.c. drive 4' Carlton, inclosed head, gr. box on base 4', 5' Dreses Plain, gear box on base 4', 5' Dreses Plain, gear box on base

4 Hammond Jack Knife, belt 5' American Triple Geared, gear box 5', 6' Niles-Bement-Pond Semi-Univ.,d. 5' Prentice, cone 6' Niles-Bement-Pond Semi-Univ., d.c.dr.

7' Fosdick, cone No. 1 Barnes Horizontal, belt

BROACHING MACHINES
Oil Geor, type XB10 Hydraulic, m.d.
No. 1, 2, 3 LaPointe, belt
No. 2, 3 LaPointe, gear box
No. 2, 3 LaPoine Double, belt
15 ton Hercules, m.d.

MACHINES. SEND US YOUR INQUIRIES.

MACHINERY CO., CINCINNATI, OHIO

## SFIECT Inland TOOLS Practically New

Power Press Brake—Cinc. 6' 1/4" Cap. All-steel Constr., A.C. M.D., LATE TYPE Universal Iron Worker — Ryerson Steel Const., High Power Quintuple, M.D.,Cap. Shear Plates 1/2", Punch 3/4 through 3/4: Angles 4x4x1/2

Turret Lathe-No. 7 Foster, grd. hd., over 70,000 serial, bar feed m.d. Planer-48"x48"x18" Putnam.

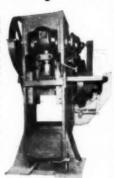
70,000 serial, but reed in.a.
Planer-48":x48":x18" Putnam, 4 heads
Thread Miller-6":x14" P. & W. Serial
1521, Gear Dr., Excellent Condition
Power Squaring Shears—6' & 10' Dr. & K. Chgo., 14 gg. cap. All steel Cons., A.C.

M.D. Press, Straight Side—No. 64 V. & O. b. g., 22" bet uprights, crankshaft dia. 4½", stroke 5" Radial Prill,—3" Morris, S.P.D. Milling Machines—No. 3 B & S plain; No.

11/2 Ohio universal fully equipped Grinder, Surface—No. 2 W & M., auto. Production Lathes—9"x14" Porter Cable Shapers—16" to 26" back geared Punch Presses—O.S.I., sizes from 1 to 5.

Inland Machinery Company 41 So. Clinton St.

Verson All Steel, Straight Side Press. D.B.G., 26"x 27" bed area, 1434" die space, 2%\* bolster, 174\* between gibs. 8" stroke, friction clutch. "V" belt motor drive, 10 H. P., G. E. motor and switch, 150 ton cap.



### Acme Equipment Co. 128 S. Clinton St., Chicago, III.

## MACHINE TOOLS

- 1—No. 3 Cincinnati Plain Milling Machine s.p.d. all geared feeds and speeds working surface of table 13½x53¾"
- 1—No. 3B Milwaukee Plain Milling Ma-chine, s.p.d., all geared feeds and speeds, working surface of table 15x55"
- 33 Kempsmith Production Milling Machine s.p.d. working surface of table 12"x48"
- 2—Niles Bement Pond 38"—44" vertical turret lathes, s.p.d. through gear box with 5 hole turret on cross rail and side
- 1-42" Niles Bement Pond Vertical Boring Mill, s.p.d. through gear box; with 2 swivel graduated heads on cross rail, max. swing 44"
- 1-No. 3A Warner & Swasey Universal Hollow Hexagon turret lathe s.p.d., all geared head, all power feeds to tur-ret and to cross slide. Serial over 114,-

- 000 For chucking work. Hole through spindle about 31/4
- 1—22" Libby Universal turret lathe, s.p.d., all geared head, Power feeds to turret and to cross slide; for chucking work. Hole through spindle 61/4". Swing over bed 22"
- 2-24" Steinle Universal Turret Lathes, s.p.d. all power feeds to turret and cross slide. For chucking work, 61/4" hole thru spdl. Swing over ways 24"
- 1-10x36" Landis Self Contained Plain Cylindrical grinder rebuilt and guar-anteed, all automatic power feeds
- 2-No. 2 Brown & Sharpe Universal Grinders, belt drive, 12" swing, 30" max. distance between centers
- 1-72A3 Heald Sizematic Internal grinder; Hydraulic feeds, 2 motor drive
- 1-72A3 Heald Gagematic Internal grinder, hydraulic feeds, 2 motor drive.

Laurens Bros., Peoples Bank Bldg., Cincinnati, Ohio Parkway 3315

## **BUY WITH CONFIDENCE**

#### BORING MACHINES

No. 2 Coffman, 3¾" bar, motor drive. No. 2 Barrett, 5" bar, extension bed.

#### BORING MILLS

42" Gisholt 48" Gisholt.

48" Colburn.

" Gisholt. 54"

54" Colburn. 60" Colburn.

72" Bickford.

72" King, motor drive. 72" Niles, Bement, Pond, M.D.

10' Niles.

#### DRILLS

No. 2 Colburn, 3, 4 Spindle.
No. 314 Baker Heavy Duty.
No. D4 Colburn Heavy Duty.
No. 4—5 spdl. Foote-Burt rail.
No. 1, No. 3, No. 4 Baush Multiple.
3' Western Plain Radial.

Western, motor on column.

Carlton plain.

6' Western Plain.
6' Western Plain Radial.
7', 8' Western heavy Radial.

#### GEAR CUTTERS

No. 1/2, No. 1 Pfauter Hobber. No. 3, 4, 5, 6 Brown & Sharpe. No. 2, No. 3 Pfauter Hobber. No. 2—60" Goss Hobber.

Nos. 6, 61, 62, 624, 645 Fellows. No. 6A—Cinn. Auto.

#### GRINDERS

Generator, m.d.

21/2 Universal (Bath type).

No. 2, 2½ Universal (Be No. 4 Landis Universal. No. 70 Heald Internal.

No. 16-A Blanchard Auto. Vert. Surface.
No. 22-12" Heald Rotary Surface.
No. 25—Heald Surface.
16" x 32" Landis Crankshaft.

NORTON MOTOR DRIVEN

#### GRINDERS

10"x72" 10"-15"gapx72" 10"x96" 10"x120" 18"-16"x50" 16"x72" 6"x18 6"x32" 10"x18" 18"x96" 18"-24"gapx96" 21"x96" 21"x144" 10"x24" 10 x120 10"-15"gapx24" 14"x36" 10"x36" 14"x50" 10"x50" 14"x72"

#### LATHES

16" x 8' Lodge & Shipley, Taper. 16" x 9' Chard. 18" x 8' Lodge & Shipley.

18" x 12' American, geared head. 20"x10' Lodge & Shipley Grd. Hd.

20"-40"x10' Rahn-Larmon, geared head,

Grd. Hd., M.D.

sliding bed gap.
20"x12" L. & S., Grd. Hd., M.
20"x12" L. & S., Grd. Hd., M.
24"x18' Lodge & Shipley.
24"x18' American, Grd. Hd.
24"x20' L. & S., Grd. Hd. Taper.
24"x22' Lodge & Shipley, Taper.

24 x22 Loage a shipley, 27"x18 American, grd. Hd., Taper 27"x18 Sidney, Taper 30"x12' L. & S., Grd. Hd. 30"x12' Lodge & Shipley, taper att.

30" x12" Loage & Snipley, taper att.
36" x 21" American, geared head.
36"x16' American, taper.
36"x24' Bradford, taper att.
40"x12' Fifield.
46"x30' Houston, Stanwood & Gamble, m d 60" New Haven turning & boring.

#### MILLERS

No. 1½A Milwaukee Plain. No. 2 Brown & Sharpe Plain. No. 3 Kempsmith Plain.

3 Cinn. Plain. No.

No. 3 Kempsmith Univ. Maximiller.

No. 3 Cinn. Vertical.
No. 5-B, No. 6, No. C-2 Becker Vertical.
No. 3 Garvin Duplex Mfg.
No. 4 Hendey Mfg.
Type "B' Briggs Mfg.

Type "B" Brigg No. 7-H Becker

No. 8 Hendey Mfg No. 12 P. & W. M

No. 12 P. & 24" Cinn. D Mfg.

Cinn. Duplex.

No. 33 Becker Brainard Mfg. 36"x36"x12' Newton Slab. 38"x44"x20' Ingersoll Slab. 72"x16"x14' Ingersoll Slab.

#### PLANERS

24"x24'x6' Rockford. 24"x24"x12' Gray. 36" x 30" x 10' Gov

36" x 30" x 10" Gorton.
36"x36"x8, 18' Cincinnati.
42"x42"x30' Niles-Bement-Pond, Rev. M.D.
44"x36"x12' Grav.

Gray.

48"x48"x16' Niles-Bement-Pond. 72"x60"x16' American

#### PRESSES

No. 01, No. 1 V&O., O.B.I., M.D. No. 1½ V.&O., O.B.I., M.D. No. 20 Bliss, O.B.I., M.D. No. CG—24 Ferracute O.B.I., Geared, M.D. No. 3; No. 5 V.&O., O.B.I., grd., M.D. No. 58 Toledo Nosing press

#### TURRET LATHES

No. 4 W. & S. Univ. No. 6 Warner & Swasey. 3"x36" Jones & Lamson. 24" Warner & Swasey

24" Steinle.

24" Gisholt.

34" Gisholt, motor drive.

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10' Pond, vert. 96" table; Betts
10 Ft. 16' Extension type;
72" Colburn rapid travers 10 Ft. 16 Easterayerse vert. 72" Colburn rapid traverse vert. 42" Bullard, New Era, Side Hd. 24" Bullard Rapid Prod. Side H. Rallard & Colburn 42" Bullard Bay 24" Bullard & Colbus 30" Bullard & Colbus 42" (isholt Vertical 42" (isholt Vertical Bausch Vert 2 heads

BORING MILLS-HORIZ. No. 33 Lucas, 4½" bar. M.D. No. 300 G. & L. 4½" bar; Beaman & Smith, 5" dia. sp. 12" Niles Cyl. Dble. End 7" Bar Putnam-table type

BRAKES, CHGO. STEEL and—3'16, 4'12, 4'16, 6'16, 8'18, 8'16, 8'14, 10'14, 10' Hand

Bex & Pan—4', 5' 14 ga, 4' & 6' 10 ga, 10' 10 ga Power—10' 2'''—12' 4''—12' 3/16''—10' 10 ga,—8'12— 6' 10 ga, 6' 12 ga. 10'18

10 ga, 6' 12 ga. GRINDERS 16 Blanchard" sur No. 16 Blanchard" surf 36" chk. Heald Rot. Sur., 16" Mag chuck; No. 3, 4 G. & L. Tool & Cutter, No. 25 Landis Cyl., 24 'x144"; No. 16 Norton surf., 72" HEONWORKERS.

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am. Grd. Hd. 18x8; 24x16; 16x8 Bradford; 16x6 P&W; 30x18, 36x30 L&S L&S 18<sup>m</sup>x 10<sup>r</sup> Grd. Hd. M.D. 30<sup>r</sup> Po-Lather, 156<sup>r</sup> face.

Lathe, 156" face plate
LATHES — TURRET
No. 1B Foster, bar feed
No. 4 Warner & S. Univ. M.D.
No. 2-A. No. 3-A Warner & S.
21" Gisholt

MILLERS No. 3 Kemp, No. 3A UNIV

B&S PLAIN No. 3-B Milw, No. 2-M Cin. Motor in base; No. 4-B Milw, Duble, overarm, MD. No. 3 Van Norman Duplex—Vert. hd. M.D.; No. 4 Cin. Verti-cal No. 3 Ryeson-Con. Vert. No

2x2x 1 Drop End Housing, sizes—18' x1": 12'x11": 7'x2". 20' Cov. Cap. 1½" 6' Bertsch 42"

RADIAL DRILLS American 21'; 4'; 6'; West. 6'; 5' Fosdick Econmax, Mt. on arm 5' Fosdick

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Slotter, Vert. 6" Fratt & Whitn.

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No. 781, No. 771 Bliss
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No. 305 Bliss—6" st. (3)
No. 66 Consolidated, 8" st

stroke PRESSES. Double Crank No. 92H Bliss No.

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Nos. 1, 2, 3, 4, 6, 6;
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Bulldozer, No. 4 L&A 16" str.
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Hydraulis Scrap Baler—150 lb,
bales, Galland & Henning,
66"x16" x24" (Chumber.
Flanger 4" McCabe
Nibblers: No. 236 Gray 36" th.
No. 2B Campbell 2"x30 thr.
Press Brake—10"10 ga. Ohl
Presses, Knuckle Joint Embos,
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Z. & H.
Gang Punches. Bertsch. 48"

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Punches, sgle. end 72" thr. 2"x 1" cap.; 36" throat cap.11x1" 1" cap.; 36" throat cap.1 x1" Slitters, Gang 24" 32" 36" 48" Welders, Spot 5, 71, 10, 15, 20

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34" Bar P & H No. 12 Floor 5" bar Niles - Bement - Pond, Knee Type, Rotary Table 6" bar Barrett Cyl. Borer 4" bar Gisholt, knee, M.D. 8" bar Beaman Smith, Floor

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Vertical

10\*-16' Niles Ext. Type M.D.

72" N. B. Pl. P.R.T. M.D.

72" Colburn, P.R.T. New.

60" Betts, M.D.

48" Gishott, P.R.T., M.D.

44" Putnam, P.R.T., M.D.

44" Rullard, Maxi-Mill P.R.T.

26" Bullard, P.R.T. M.D.

36" Bullard, Rapid Pro.

36" Colburn, 1 Turret Head.

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6' Mueller, Gear box, M.D.
6', 4' & 5 Clinc, Bickfords
21', 24' & 5 Clinc, Bickfords
22', 24' & 5 Clinc, Bickfords
24', 24' & 5 Clinc, Bick,
25', Amer. Tri, Per Monoarm,
26' - 6'' Amer. Tri, Grd,
2 spindle Allen M.D.
4 Spindle No. 2B Edlund,
4 Spindle No. 2 B Edlund,
4 Spindle Bausch No. 2 M.T.
No. 224 Foote Burt.
26'' Barnes Camel Back (5)

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8"x54" Fitchburg Pl., m.d.
10"x52" Landis Plain.
16"x50" Norton Self Cont.
No. 6 Bryant Chucking
12"x48" Diamond Surf. No.3
16"x80" Cinct. Cyl. M.D.
18" Bealy No. 26 Disc.
24" Resly Disc M.D.
18" Badger No. 220 Disc.
20"x96" Landis
No. 11 Landis Tool & Cutter.
No. 33 Abrasive Surface.
No. 55, 60 and 65 Heald Cyl
14" New Yankee Twist Drill
Heim, Centerless.

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12"x6' So. Bend L.C.G. Cone. 14"x6' Claco t.a., draw-in. 14"x6' Monarch, q.c.g., cone. 16"x6' So. Bend, L.C.G. Cone. 16"x8' Lodge & S., M.D. 16"x8' Simplex Q.C.G., Cone.

Pan.
16"x8' Prentice, Grd. Hd.
16"x10' Mona'h L.C.G. Cone.
17'/19"x10' Sidney Q.C.G.
18"x8' Amer. Grd. Hd. (2)
18"x8' Walcott Q.C.G. Cone.
18"x8' Barnes L.C.G. Cone.
18"x8' Lodge & S. Cone.

## (Continued)

19"28' LeBlond, Cone.
20"212' Greaves K. T.A.
20"212' Greaves K. T.A.
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20"212' Eve Haven, T.A.
21"21' Eve Haven, T.A.
24"214' Eve Haven, T.A.
24"214' A merican Cone
24"214' American Cone
24"214' American L. C. G.
24"214' L & S. T.A., Cone
25"212' LeBlond, Q. C. G., Cone,
25"212' LeBlond, Q. C. G., Cone,
28"15' Roce & Emmes.
28"(50"815' N.B.P. Axel & Journal, Center Drive, M.D.
30"213' N. B.P. Gred Hd. M.D.
30"213' N. B.P. Gred Hd. M.D.
30"213' Fined truple of M.D.
36"225' Pond L. G. Cone,
28"215' Pined truple of M.D.
36"225' Bridgeford, M.D.
36"225' Bridgeford, M.D.
36"224' Bridgeford, M.D.
36"224' Bridgeford, M.D.
42"240' N.B.P. Gred, Hd.
48"336' Fified, m.d.
90" N.B.P. Heavy, Wheel

No. 2 Hendey Uni. Cone, MD.
No. 6 Becker Vertical.
Model C Becker Vert. S.P.D.
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Geared Head, S.P.D.
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34" Cincl. Semi. Auto.

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48"x48"x12" D&H Openside.
48" x 48 x 10" Gray, 2 Hds.,
48"x36"x10" Gray, 2 Hds.,
36"x36"x20" Chandler 4 Hd.
24"x30"x86" Cinci, 2 Hds.,
36" Newton Rotary, M.D.
30"x30"x10" D. &H. Openside.
30"x30"x87 Powell 2 hds.
27"x27"x5" W. & P., 1 Hd.
24"x8" Gray; 24"x7", Niles.
24" Lynd Farguhar Openside.

#### TURRET LATHES

34"x36" Cinci, Acme, Grd. Hd. No. 1 Cincinnati Acme Semi-Univ. Timk. Bear., M-in-B.

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No. 5 Foster, 1-13/16" bar. No. 6 Foster, 2-½" bar. No. 9 & 2 Bardons & Oliver 21" Gish. 33" H.S., 2 cone 24" Gish. 6; H.S., 2 cone 28" Gisholt M.D. 2½" "22" & 3"x36" J. & L. No. 4 W. & S. Univ. Cont M.D. (2).

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Automatic, 24" Gridler, 1 Sp. Billet Breaking Mach., Ajax. Bolt Threader, 14" Landia. Bolt Threader, 2" Landia. Bolt Threader, 2" Landia. Broach, No. 2 Lapointe Belt. Chucking, Nos. 34 & 23 N. B. Die Sinkers, No. 6 Jackson (3). Flanger, 4" McCabe Pheu. Gear Cutter, No. 13 B. & S. Gear Gen. 11" Gleason Bevel Gear Planer, 24" Gleason. Gear Hobber, 6" Plauter. Hammer, No. 2B Nazel, M.D. Header, 14" Acme Rivet. Header, 2" Acme, Steel. Keystra, No. 1 Bak., No. 1 Dav. Keyseat, Nos. 2, 3 & 4 M&M Pipe Mach. 4" Landia, M.D. Pipe Mach., 8"x12" Williams Pipe Mach., 12" Curtis & C. Pipe Mach., 2" Bignall Keeler. Press, No. 8; 2 & H Percussion Press, Foreing 50 ton Lucas Press, No. 1 Spec. V & O. Presses, No. 1 Spec. V & O. Presses, No. 18 Bliss B. & Fl Punch & Shear No. 47 PBC B. Punch, 54" H & J No. 2 D.E. Punch, 3" Whit. 3"x4" Rolls, 8"x1" H&J No. 2 D.E. Punch, 3" Whit. 3"x4" Rolls, 8"x4" H&J No. 2 D.E. Punch, 3" Whit. 3"x4" Rolls, 8"x4" Mey Milland. Saw, 6" Gorton No. 2B Inter. Saw, 12" 415" Racine M/D. Saw, 6" Gorton No. 2B Inter. Saw, 12" 415" Racine M/D.

Saw, 6" Peerless Univ. M.D. Shaper, 16" American, Cone. Shaper, 24" Gould & Eberhardt Shapers, 24" & 20" Queen City M.D. Shaper, 16" Ohio, M/D. Shaving Mach. P. & W. Vert. Shear, Srai" H.&J. No. 2 12"

gap.
Shear, 30" Clereland, No. X.
Shear, 156"xi" United, 36" g.
126"xi" Amer., 22" Gap.

Slotter 15"-18" Dill. Slotter, 24" Dill A.C., M.D.

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Driven. No. 6 Whitney Hand Millers.

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Gridley 4-spdl. Mod. F. §" 1½". Cleveland, §" Model B, 2" Model A, 5-hole (4). Cone 1" 4-sp. straight line cut-off M.D.

off M.D.
Gridley, 21" single spindle.
Acme, No. 53—1" 4-spindle.
New Britain No. 24 chucking with
tapping attach.
New Britain 1x5, 6-sp. M.D.
F. & Whitney 1 x 8 Auto. Lathe

BORING MACHINES Barret Hor. Boring Bar, 3½".
Barnes No. 1 horiz, dbl. sp. Boring & Drilling (2).
Moline No. 5 hole hog, 6-sp. SPD.
Betts 3" spindle

BRAKES

Brake, Dreis & Krump 4' box & Pan, cap. 16-Ga. Dreis & Krump 6' hand, cap. 16 OTAL.

BROACHING MACHINES LaPointe No. 1, No. 2, No. 3-B.

DRILLS
Colburn No. 4D heavy duty,
comp. table, 8, P.D.
Aveymatic, 2 Sp. M.D. pump &
tank, 12 overhan,
Avey No. 3 SSp. F. M.D.
Leland-Gifford 2 Sp. F.F. M.D.
Leland-Gifford 2 Sp. P.F. on each
Spd., M.D.

Hen? & Wright 3-sp. M.D. Sundstrand Hor. Center. & drill. Barnes, 20"—4-Sp. morse taper No. 4, P. F. on each Sp. Leland & Gifford 4-Sp. H.S. B.B.

Leland & Gifford 4-8p. H.S. B. B. equipped with tapping chuck on each spindle.

Bausch No. 4 Mul., 28" Sp.B.D. Natco, No. 11 12-sp. No. 1 taper, P.F.: B.D. Natro No. 30, rect. hd. rotary table, M.D.

RADIAL DRILL Fosdick 2-1'-9" G.B.D. round column

GEAR HOBBERS

GRINDERS Heald, No. GRINDERS
Heald, No. 60 Internal B.D.
Murray, Disc 24\*discs, disc press.
Bryant, No. 10 chucking.
Van Norman No. 3.1 Automatic
Internal Radius B.B.
Ingersoll cutter Tub (2).

HACK SAWS Peerless 6x6 H.S. B.D. Marvel No. 5 H.S. B.D. Racine 12x12. HAMMERS

Bradley 100 lb. short helve Mayer 100-lb. trip. Niegara 200 lb. board drop. 3-A Hi.-Speed, arr. for M.D.

3-A Hi.-Speed, arr. for M.D. LATHES Charl 18"x8" qk. chg. Porter-cable. 9x14 grd. hd. Suustrand, 9x24 Mfg.ard.hd. M.D. LeB. qk. chg. cone hd. 24"x16" Schumacher-Box qk. chg. 24"x 16" cone-hd.

16' cone-hd.

McCabe double spindle 26x48x12'
Lodge & Shipley Grd. Hd. 30"x
16' qk. chg. arr. for M.D.

Fifield 40"x12" loose-change.

"SPECIAL"

"SPECIAL"
Univ. 2-4" horiz bor, drill, & Mill. Mach. S.P.D.
W. & S. No. 2-A Univ. M.D.
L. & S. 30"x16" ord. hd. qk. chg. arr. for M.D.
K. & T. No. 1-1-B pl. Miller, dbl. over-arm S.P.D.
K. & T. No. 1-A Mfg. pl.
Mill., dbl. over-arm S.P.D.
P. & W. 1x18 Auto. Lathe

MILLERS
Ingersoll 24x24x10', two side
hds., one hd. on rail M.D.
Pratt & Whitney No. 4 vert. Die
Sinking, equip. with cherrying
attachment.
Steptoe No. 0 hand, U. S. No. 1
hand M.D.

yseat planer type, vert.sp.

PRESSES Robinson No. 4"-40" v

Robinson No. 40-B D.C. stroke

4" -40" wide

4" -40" wide

Consolidated No. 55 Trimming,
side shear, F.W.T., MD.

Niagara, 5-8 dbl. action Cam.Grd.
Beatty No. 7 single end, 6" M.D.

Williams & White No. 13 single
end grd. 36" throat, M.D.

Rock River No. G-15 single end

16" throat.

Cameron. S. S.

16" throat. Cameron, No. 30 arch F.W.T. Niagara, No. 13 horn. F.W.T. Kling. No. 4 single end, 15"

Kling. No. 4 single end, 15" throat grd. Kling No 2 single end, 19" throat F.W.T. Bliss No.18, No. 19, No. 21

Bliss No. 18, No. 19, No. az inc. f.wt. 60 toggle joint kick. Bliss, No. 34-B Toggle single grad. 87 str. Bliss No. 68 dbl. action F.W.T. Zeh & Halmemann No. 84 power Toledo No. 52 Arch. Adriance No. 45 dbl. action cam American No. 5 f.wt. Toledo No. 6 grd. Inc.

Tol. No. 14-½ horn, sw. tb. M.D. Toledo No. 5-A inc. M.D. Toledo No. 4 grd. M.D. Toledo No. 4 plain, F.W.T. Willard No. 6-A inc. f.w.t. 200-ton hydraulic tire Dunning & Boschert hyd. 50-ton cap. 20" str. Barnes Screw (2)

Barnes Screw (2)
PLANEES
Gray 24x24x6', one head.
Woodward & Powell, 30x30x8.
SHAPERS
Milwaukee 24" bk. grd. C.D.
G & E 20" bk. grd. C.D.
Potter & Johnson 15"
Walcott 14" bk. grd. M.D.
Hamilton V-ram, M.D.

SHEARE SH

18 ga.
TURRET LATHES
Steinle 24" Grd. Hd. M.D. 61"
hole in spdl.
B. & S. No. 6 Hd. M.D., pwr. fd.
Warner & Swasey No. 7, fr. hd.
Greenlee, flat turret.
Dresse 1635' fox.
Warner & Swasey's, No. 1, No. 2,
No. 2A Iniv., No. 4, No. 6.
Patt. & Whitner 1-5 \*x18" cap.
F.F. Pratt & Whit. 1"x14" P.F. (3)

WELDERS
Agnew No. 10-D type D.
Todd twin arc, H.P. 7, 150 amp.
Dyer 2 KW bench type.

WIRE STRAIGHTENER

Wells, cap. 2" and 4".

Wells, Cap. 4" and 4".

Wells, Cap. 4".

Wells, Cap.

for the sinking. Garvin Die Slotter. Niles Die Slotter 36" Erie Steam Hammers. 1000 lbs., 1500 lbs. Garvin 800 lbs.,

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No. 3 Brown & Sharpe Vertical Mill. Equipped with clearing duplicator.

24" Cincinnati Duplex Mill. Widened pattern.

24" Gould & Eberhardt Shaper. M.D.

4 spindle Colburn Heavy Duty Drill Press. No. 263 Barnes Camel Back Drill. Sliding head.

84" Diamond Face Grinder. 30" wheel, 40 h.p. motor.

7/8" 1-1/16" model M, 4 spindle Cleveland Automatic. M. D.

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DRILLS, RADIAL

30°x16' New Haven Q.C. 24°x12' Boye & Em. Q.C. 21°x10' LeBlond. 18°x12' Hendey, Q.C.

18'x8' National. 18'x8' Greaves Klusman. 16'x8' Lodge & S., Q.C. 14'x8' Cisco Q.C.

#### 41 Western.

MILLING MACHINES No. 1 Brown & Sharpe Univ. No. 1B Brown & S., Plain.

PIPE MACHINES

6º Oster. 12º Curtis & Curtis.

#### McBRIDE & McCLENNEN

20 Stockbridge. 20 Steptoe. 24" Gould & Eberhardt.

30'x30'x10' Pond.

Since 1919

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26" x 26" x 8' Fitchburg.

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#### LATHES

11x5 Seneca Falls 14x6 South Bend 14x6 Hendy Yoke Head 16x6 Hendy Yoke Head

16x6 Pratt & Whitney Geared Head

14x28x8x12Fay & Scott 18x10 Hendy Yoke Head 18x10 Boye & Emmes 42x10 Fay & Scott 37x14 Fay & Scott

28x56x28 McCabe-2 sp.

24x14 Lodge & Shipley BORING MILLS

31/2" Detrick " Detrick & Harvey Horiz. fl. type

36" Bullard—2 heads

36" Bullard—2 heads
MILLERS & SHAPERS
No. 1½ Brown & Sharpe Universal
No. 2 Brown & Sharpe Universal
No. 2 Kempsmith Universal
No. 2 Kempsmith Plain
No. 2 Cincinnati Universal
No. ½ Van Norman Duplex (3)
No. 3 Hendy Norton Universal
No. 3 Brown & Sharpe Plain

No. 3B Uw 16" Steptoe 3B Owens Plain

16" Springfield

20" Smith & Mills

24" Cincinnati 24" Steptoe

#### PRESSES

No. 2 Zeh & Hahneman
Nos. 18-19-19/2-19C—20 Bliss Presses
No. 36-5 Zeh & Hahneman
No. 2½ V & O
No. G5 & C6 Ferracute
No. 126 Max Ams
No. 23 Adriance Horning
Baird Dial Feed Press
No. 2 Bliss Double Crank
No. 3 Bliss Punch Presses

MISCELLANEOUS

10' Dreis & Krump Hand Brake 1-2-3-4 Sp. Henry & Wright Drills 2 Sp. Leland & Gifford Drills

Bickford, Hamilton & American Rad. Drills Iones & Lamson Turret Lathes, Planers

Wilmarth & Marmon Univ. Grinders Several No. 2 B & S Surface Grinders No. 2 Mitts & Merrill Keyseater

GRAND MACHINERY EXCHANGE, INC.

148 CENTRE STREET,

**NEW YORK** 

## VIGGLESWORTH MACHINERY CAMBRIDGE, MASS.

199 BENT STREET.

Cable Wigmachine



#### PUTNAM 48-INCH STANDARD CAR WHEEL LATHE

#### CONDITION LIKE NEW

| CAPACITY:                              | FEED:                               |
|--|-------------------------------------|
| Turns Wheels with tread dia            | Amount of Feeds                     |
| Maximum size journals (M.C.B.)6" x 11" | D. C. MOTOR DRIVE:<br>Driving Motor |
| HEADSTOCK AND TAILSTOCK:               | 35 HP. 550 volt                     |
| Main spindle diameter and length front | 55 Amps., 400-12                    |
| bearing                                | Faceplate Speeds<br>.8 to 2.4 RPM   |
| bearing                                | Tailstock Traverse                  |
| Internal spindle diameter              | Motor is 5 HP, 550                  |
| CARRIAGE:                              | volt, 8.1 Amps.                     |
| Length of bearing on bed28"            | All starting equipm                 |
| Machine New in 1927                    | motors.                             |

#### HP, 550 volt Amps., 400-1200 RPM plate Speeds to 2.4 RPM ock Traverse

tor is 5 HP, 550 t, 8.1 Amps. starting equipment for motors.

#### MACHINE TOOLS IN STOCK AT PRESENT

| AUTOMATICS                            |
|---------------------------------------|
| No. 00 Brown & Sharpe Screw Machine.  |
| No. 53 National-Acme 4 spale.         |
| 31/4" Single Spdle. Gridley, Model L. |
| DRILLS                                |

2, 3 or 4 spdle. drills. 21" Cincinnati Sliding Head. 21° Cincinnati Siding riedu.
No. 3 Avey Ball Bearing Upright.
26° Barnes Sliding Head.
No. 11 Pratt & Whitney Multiple.
No. 12 Pratt & Whitney Multiple.
3½° Western Radial, M.D.
6° American Radial, S.P.D.

15"x7' Seneca Falls Tool Room. 16"x8' Hendey, q.c.g. 18"x9' Chard, Semi-quick-change. 18"x12' New Haven, 1.c.g.

No. 1½ Knight Vertical. No. 1½B Kearney & Trecker Universal No. 2 Brown & Sharpe Universal (2). No. 3B Brown & Sharpe Plain.

FLANERS 30"x30"x10" Whitcomb Second-Belt. 38"x38"x9" Flather, 2 heads. 42"x42"x10" Detrick & Harvey O.S. 48"x48"x32" Detrick & Harvey O.S. PRESSES

No. 1½ Bliss Cam-Action Drawing.
No. 3 V & O Geared M.D. Inclinable.
No. 4 N-Bliss, Geared M.D.

No. 11 Pratt & Whitney Multiple.
No. 12 Pratt & Whitney Multiple.
31/2' Western Radial, M.D.
6' American Radial, S.P.D.
No. 12 Landis Universal Cylindrical.
No. 55 Heald Cylinders & Livingston Tap.
No. 12 NEW Gallmeyer & Livingston Tap.
14' Pratt & Whitney Surface.
15'x7' Seneca Falls Tool Room.

No. 12 VEW Gallmeyer & Livingston Tap.
15'x7' Seneca Falls Tool Room.

MISCELLANEOUS 12', 14" capacity, DREIS & KRUMP Power Apron Brake, M.D.
11" Gleason Bevel Gear Generator.
No.15 D.E. Whiton Spur & Bevel Gear Cutter.
No. 3—26" Brown & Sharpe Spur Gear Cutter.
No. 2 Garvin Automatic Tapper.
9"x9" Peerless Hacksaw, M.D.

No. 17 Foote-Burt Rail Drill. No. 4 Hilles & Jones Double End Punch & Shear, 36" throat.
No. 20 Waterbury-Farrel Threadroller.

All machines are GUARANTEED and offered f.o.b. cars or f.a.s. Boston. Direct water shipment from Port of Boston. We would like to receive your inquiries for all types of machine tools,

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AIR COMPRESSORS

528' 14 x 12 ER-1 Ing. Rand 511' 15x9x10 Chi. Pneu. O-CB BOLT CUTTERS

"Landis, geared mtr. dr. 14" Landis, lead screw BORING MACHINES

10' Betts Vert Vert. mtr. dr. Vertical

2" Fond Vertical 4" Bullard Rapid Prod. Vert. 2-2" Sel. Horiz., knee type

CRANES

15 ton 50' span Shepard

15 ton 40' span Niles OET

5 ton 28' 1½" span Roeper DRILLS

Sellers Radial, mtr. dr. Mueller Semi-Univ. Radial 6' Mueller GRINDERS

3' American Radial 26×96" Norton Pl., mtr. dr. 10\*x36" Cin. Univ., belt dr. 10\*x36" Landis Pl. Self-Cont. 10\*x36" Landis Pl. Self-Cont. 30\*x34" Diamond Face Grind No. 72 A5 Heald, byd. feed No. 70 Heald Internal Grinde 7.2\*x16" Sichel Hob Grinder 12\*x12\*x36# Diamond Surface Grind. Grinder Surface

No. 2 Sellers Tool Grinder, 8" Heald Rotary Surface No. 2 Sellers Drill Grinder Sellers Drill Point Thinner

HAMMERS 300-ton United Engr. Steam Fg. 1400 lb. Sellers Steam Forging 600 lb. N.R.P. Single Fr. Forg. 300 lb. Sellers Steam Forging

14"x6" Brau.

16ev. and draw in attaen.

24" Steinle Tur., 64" spill.

24" Gish. Turret, 6" spindle

24" Gish. Turret, 6" spindle

24" Gish. Turret, 6" spindle

24" Steinle Tur.

No. 6 Brown & S. Turret Lathe

No. 4 M dilholland Turret

No. 4 M & S. Furret Lathe

No. 4 M & S. Furret Lathe

No. 4 M & S. Furret Lathe

No. 3 14" W.&S. Fox Lathe CD

2—Bardons & O. Auto, F. L.

11—34" Grid. Sgl. Spill. Auto.

13—24" Grid. Sgl. Spill. Auto.

13—24" Grid. Sgl. Spill. Auto.

2—1-4" Four-Spill. Gridleys

8-4" Cleveland Model A MILLING MACHINES

Spdl No. 34 Pratt & W. Dble. Spdl. No. 2M Potter & J. Mfg., SPD No. 4 Cinc. Plain Miller Whitney Geared Hand Miller 11"x24' Milled Screw Co. Thd. No. 27 Smalley Gen. Thd. Mil-ler, 18" pot chuck, 39" dep-10" hollow spdl.

ler, 18" pot chick, 39" deep, 10" hollow spdl. No. 23 Smalley Gen. Thd. Millers, 6" spindle

Millers, 6" spindle PLANERS 72"x72"x32" N.B.P., 4 heads 54"x54"x54" Sellers, 3 heads 36"x36"x14" Hamilton, 3 hds. 40' Sellers Plate, mtr. dr. 30' Niles Plate Planer, m.d. 22" No. 2 Hilles & J. Plate Pl.

PUNCHES & SHEARS
Camden Dbl. End, stl.fr.,45"th.
Pels, Rlums No. 26, 24" thr.cap.
1-\(\frac{1}{2}\)" thru 1", arch. jaw
No. 6 Hilles & J. Angle Shears

5LOTTERS 72" Newton Vert. Pl. mch.,m.d. 18" Bement Crank Slot., m.d. MISCELLANEOUS

10'x3" Teal Per

10'x2" Teal Pyr. Roll. drop end No. 504-42" Newt. Cold Saw,12" 6,000 lb. Auto Trans. 72" Tier

16" x 24" 2-Hi Bliss Duplex Mill, 250 HP motor and gear reduction 16" x 24" Bliss Revers. 2-Hi Cold Strip Mill, 350 HP 440 V. AC mtr. 3-Stand 10" x 12" Bliss 2-Hi Cold Roll Strip Mill, 75 HP mtrs.

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Philadelphia, Pa.

## NEED GOOD TOOLS? — SEE US FIRST

D-31 FOX MULTIPLE DRILL, RECT. HEAD, 16"x311/2" spindle centers. Bored for 36 spindles. Has ten 11/4 No. 2 Taper spindles. Power feed to head.

AUTOMATICS, Several Model A Clevelands, from 5%" to 334" bar capacity.

BOLT CUTTER, 11/4" Acme single, class A; Landis.

DIES and EQUIPMENT to make square cans, pt., qt. & Gal. size.

DRILLS, 36" Cincinnati back geared, ing head, tapping attachment; No. 2 Colburn Manufacturing; 36" Snyder, back geared; No. 12 Minster H. D.; 24" Barnes All Geared Self Olling B.D.

GRINDERS, 78 W. & M., Surf., M.D.

HAND SCREW MACHINE, Wells 34" capacity.

LATHES, 38"x14' Fifield - Cheap; 16"x8' Sidney, double back geared, quick

change: 14x6 Carroll Jamison: 18"x8" Lodge & Shipley, Geared Head.

MILLERS, No. 6 Becker Vert. with ball bearing countershaft; No. 3H LeBlond heavy duty pl.

MONITOR LATHE, 16' Dreses, universal, with chasing bar.

PLANERS, on rail; 36"x15' Betts, 2 heads.

PRESSES, No. 1 Bliss (2) No. 3 Minster. 1 Bliss Cam Drawing Press,

SCREW MACHINES, No. 4 Foster cone head; 11/2"x9"; Acme cone head.

SHAPER, single Pulley drive.

TURRET LATHES, 21" Libby and 21" Gisholt. (3).

Many other tools-exceptional "buys"-write for full details.

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## HIGH GRADE TOOLS

16" x 6' Lodge & Shipley Grd. Hd. M.D. 12 speed.
16" x 8' American Grd. Hd. 12 speed. Motor in base.
18" x 8' Monarch Grd. Hd. Motor in Base.
18" x 8' Lodge & Shipley Grd. Hd. M.D. 12 speed.
20" x 8' American Grd. Hd. 8 speed.
20" x 8' American Grd. Hd. 12 speed, Motor in base.
24" x 12' Monarch Grd. Hd. 12 speed, Motor in base.
24" x 12' Monarch Grd. Hd. Drop levers in apron.
26" x 12' Bridgeford Grd. Md. Motor drive.
26" x 18' Bridgeford Grd. Hd. Motor drive.
30" x 10' American Grd. Hd. 12 speed, M.D.
30" x 16' American Grd. Hd. 12 speed, M.D. 2 carriages.
4' American Triple Purpose Radial, Motor Drive.
No. 16-26" Blanchard Grinder, Motor on spindle.
No. 48 Milwaukee Double Overarm Plain Miller, Arr. M.D.
48" x 48" x 16' Pond Planer, H.D. 4 Heads, Arr. M.D. No. 3A Warner & Swasey Turret Lathe, S.P.D.

#### Lathes

Lathes
14"x6' & 16"x6' LeBlond 3 S.C.D. D.B.G.
19"x8' Le Blond, Q.C., 3 S.C.D.
21"x10' LeBlond, 3 S.C.D. D. B. G.
25"x16' LeBlond, 3 S.C.D., D.B.G.
20"x8' American, 3 S.C.D. D.B.G.
20"x16' American, 3 S.C.D. D.B.G.
18"x24' Lodge & Shipley Engine Lathe.
30"x16' Lodge & Shipley Cone Q.C.
30"x10' Hondey Cone Q.C.

#### Planers and Shapers

24" Kelly Shaper, Cone drive.
24"x24"x8' Gray Planer.
36"x36"x14' Detrick & Harvey Openside
26" Whipp Openside Crank Planer, S.P.D.
16, 20, 24" G & E Shapers, cone drive.
16, 20, 24 and 28" Gould & E. Shapers, S.P.D.
16" Ohio Crank Shaper, Cone drive.

#### Radial and Drill Presses

31½, 4', 5', 6' Amer. Triple Geared S.P.D. 4', 6' American Triple Purpose S.P.D. 6' American Trip. Purpose, M.D. 23' Mueller, S.P.D. 2½' Cincinnati Bick, S.P.D. 21', 24" Cinc. B. Upright Geared Feeds. 24" Barnes Upright B.D.

#### Gear Cutters

No. 1, 2, 3 Adams Farwell Gear Hobbers. No. 12H Gould & Eberhardt S.P.D. No. 18HM Gould & Eberhardt S.P.D. No. 11 B & S spur and bevel Gear Cutter. Gleason Spiral Bevel Generators and finishers. 50" Rhenania Gear Hobbing machine, C.D. No. 1 Cross Gear Tooth Rounder.

#### Millers

No. 4 Cincinnati Hi.P. Cone 3 S.C.D.D.B.G. No. 4 Cinc. H.P. Cone Univ. 3 S.C.D., D.B.G.

No. 2 Kempsmith Univ. Vert. Hd. No. 2 Kempsmith Cone, M.D. No. 3 Kempsmith Universal Cone Cone. No. 2 Hendey Universal S.P.D. No. 3 LeBlond Plain 3 S.C.D.

#### Grinders

New Schuchart & Schutte Hob Grinder (Barg). No. 33 Abrasive Surface M.D. No. 16 Brown & Sharpe Plain. Diamond Face Grinder. No. 1 Diamond Surface Grinder. No. 1 Diamond Surface Grinder.
No. 50, 550, 60, 65, 70 Heald Internal.
No. 75 Heald Internal.
6"x18" Landis Plain, Self Contained.
10"x36" Landis Plain, S.C.
12" Pratt & Whitney Plain Surface Grinder.
53" Besley Ball Bearing Vert. Spindle Disc.

#### Boring Mills

42" Bullard rapid production, 2 heads. 48" Bullard Cone. 60" Gisholt, P.R.T.

#### Turret Lathes

No. 7 Foster Universal Turret Lathe.
No. 4 & 6 W & S Plain Cone Drive.
25" Le Blond Full Turret Lathe.

#### Miscelloneous

Miscellaneous
21/2" Landis Bolt Cutter.
No. 4 & 5 Mitts & Merrill Keyseaters.
Model W Cleveland Pch. & Shr. 60" thrt., M.D.
8"x4" Chicago Bending Brake.
6"x3"16" Chicago Bending Brake.
No. 92D Toledo D.C. Press.
No. 4A High Speed Riveter New.
2—No. 35 Niagara Presses New.
No. 36 Niagara Press Shew.
10"x3"16" Sholl Power Squaring Shear M.D.
6"x6" Peerless Shaping Saw.
8"x3"16" Capt. Toledo Power Squaring Shear,
Gao. Gap. 35 K. W. Federal Spot Welder.

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217 EAST SECOND STREET

### "CLEAN TOOLS"

24"x27"x8' Ingersoll Mill, adjustable rail, 3 heads. 14"x6' L. & S. Lathe, D. B. G., T. A. No. 2 Rockford Univ. Millers, c. dr. (2)

No. 2 Rockford Univ. Millers, c. dr. (2)
No. 3 W. &t. M. Surface Grinder, 8"x24"
14"x5' & 14"x6' Am. 8 sp. g. h. Lathes
4' Am. tr. gd. plain Radial drill, G.B.D.
OG. Brown & Sharpe Automatic
5/8"-7/8" Cl. Automatics, Model B. (4)
6N Am. Can open b. Gap Press, 88 t.
No. 46 Cons. o. b. Gap grd. Press, 6" str.
A Potter & Johnson Chuck. Machine.
No. 104 V & O OBI Draw. Pr., 6" str. (2)
No. 5-60" Brown & Sharpe Gear Cut.
No. 4-48" Brown & Sharpe Gear Cut.

No. 18H Gould & Eberhardt Gear Hob.

We have more than fifty presses in stock.

No. 12 Barber Colman Gear Hobber

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652 W. LAKE ST.

CHICAGO, ILL.

## E55LE Wachine Tools

## **Special Offerings**

Bar cutter, No. 8 Buffalo, cap. 2<sup>3</sup>/<sub>4</sub> rds., 2<sup>3</sup>/<sub>2</sub>" sq., 5"x5"x<sup>5</sup>/<sub>8</sub>" angles, 6"x<sup>7</sup>/<sub>8</sub>" flats.

Alligator Shears (2), Lewis, capacity 3" and 5" round, 18" and 24" blades.

10' Dreis & Krump, 3/16" capacity squaring shear, m. d.

24"x14' Lodge & Shipley lathe, cone drive.

THE E.L.E55LEY MACHINERY CO 831 W. EVERGREEN AUE - CHICAGO ILL

## GUARANTEED MACHINES -

Clevelands Model Ser. No. Driv. 34000 A Plain 26300 Plain 21/2" 18" feed B M.D. Brown & Sharpes No. 0 Full Auto. Plain 6800 S.P. 00 Full Auto. 5988 Plain Gridleys - %" 4 spdl. -1¼" 4 spdl. - ¾" 4 spdl. -1¾" 4 spdl. -1¾" 4 spdl. 8600 10000 M.D. 4400

1—134" 4 spdl. F 7900 S.P. HAND SCREW MACHINES
No. 1 & 3 Foster, plain head Auto. Chuck
No. 4 B. & S. Wire Feed Pwd. Feed
14", 18", 21", 24", Gisholt Turret Lathes
18" Libby Turret Lathe M.D. Equip. No. 15000

2, 4 spdl. Allen H.S. BB., B.F. %" cap. 1 Spdl. Lel-Gif. 14" swing, H.S. BB., % cap. 1 Spdl. Lel-Gif. 14" swing, H.S. BB., % cap. 1 Spdl. Avey No. 2 M.T. H.S., BB., % cap. 1 Spdl. Demco H.S. BB., %" cap. No. 3 Barnes Horiz. Radial, 3" cap. GRINDERS

Landis 10"x20" Cyl. plain BD.
No. 1 O.S. Walker Cutter grinder BD.
No. 2 B. & S. Surface, Chuck, Generator
No. 3 Wilmarth & Marmon, wet surf. Gr.Ch.
No. 3 Van Norman 4"x15" Cyl. M.D.

#### IMMEDIATE DELIVERY

Rivett %" Bench, Sc. mach. tur. & cut-off So. Bend 9"x3', 2 chucks, B.D. So. Bend 11"x5' Pl. Ch. chuck B.D. So Bend 13"x5' Pl. Ch. chuck, B.D. Hendey 18"x8' Q.C. tap. att. chucks, B.D. Schumacher & Boye 18"x10' Q.C. tap. att.B.D.

42" King Vertical Boring Mill, 2 heads 24" Bullard vertical Boring Mill, side head No. 2 Knight Vertical Univ. with slotter,B.D. No. 9 Kempsmith Plain arbor B.D. Hand Millers, Chao. Whitney, Pratt & Wright 8" Pratt & Whitney Prod. Mill Arr. M.D.

PRESSES
25 ton Henry-Wright, dieing, with feeds, B.D.
No. 15 Robinson, horn type, table, direct M.D.
No. 3 R. & K. O.B.I. 2½ str.

SHAPERS 20" Smith & Mills B.G. Vise B.D. 20" American B.G. Vise B.D. 12" Chase, S.P.D. Vise

MISCELLANEOUS

36" Niagara Power Sq. Shear 14 gauge G. & E. Rope Drop Hammer, 75 lb. cap. Hammers, High Speed, 3A and 5A Keyseater No. 2 Mitts & Merrill, equipment Tappers, Garvin No. 2, cap. ½" to ¾" B.D. Separator, Chip Bower Type 20" Band Saw, Wood, M.D. Stud Threader, Auto. ¾-%

SCOTT MACHINERY SALES, INC.

1811 Carroll Ave.,

Chicago, Illinois.

## VICTOR'S BARGAINS

# IN NEW COMBINED DRILLS AND COUNTERSINKS HIGH SPEED STEEL AND CARBON



|      | Diameter | Diameter |            | Carbon<br>Our Net | HighSpeed<br>Our |
|------|----------|----------|------------|-------------------|------------------|
|      | Body     | Drill    | Decimal    | Price per         | Net Price        |
| Size | Inches   | Inches   | Equivalent | Dozen             | Per Dozen        |
| A-1  | 3/8      | 3/64     | .0468      | \$1.50            | \$4.00           |
| C-2  | 13/64    | 1/16     | .0625      | 1.80              | 4.00             |
| D-1  | 15/64    | 5/64     | .078       | 1.95              | 4.00             |
| E-1  | 3/10     | 3/32     | .0938      | 2.10              | 4.00             |
| E-2  | 3/10     | 1/8      | .125       | 2.10              | 4.00             |
| F-1  | 7/16     | 5/32     | .1563      | 2.70              | 6.00             |
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No. 183 Chicago 8ft. 12-ga., pwr.

Radial, 3 ft. Fordick. Natco Type K 20-apdl. Rail. Foote-Burt Nos. 2 & 4, 4 spdl. Prentice, 4-spindle.
Allen BB 5-spindle.
Allen BB Type B sgl. spdl
Demco DAH BB, MD.
36° Cincinnati BG PF SI 25° Bickford, G. & E., Slid, Hd., P.F P. F. 20\* & 24\* Prentice BG. 21\* Aurora, B. G., P. F.

#### GRINDERS:

GRINDERS: Disc, No. 6—20 Besly. Disc, No. 220 Badger & press. Drill, New Yankee, D. E. Internal, Madison: No. 65 Heald, Surface, No. 210 Heald 8°. Surface, LaSalle.

#### HAMMERS:

50-lb. Little Giant MD. 40-lb. Bradley Helve.

#### LATHES:

24\*x14' Niles, P. C. G. 16\*x8½' Rahn & Mayer. 18\*x8' Lodge & Shipley MD. 16\*x10' Sidney QCG., taper att. 15\*x6' Flather, S. B. G. 14\*x6' Lodge & Shipley.

#### LATHES\_Turret:

16" Type A Gisholt, 6¼" hole. 21" Type H, Gisholt, 3½" hole. 24" Type I Gisholt, 4%" hole. 24" Type I Gisholt, 4%" hole.

#### MILLERS:

No. 25 Becker-Brainard. No. 3B Owen, DH, Vert. att. Pratt & Whitney, 2\* spline.

Hydraulic, 42-ten Elmes.
OBI, No. 0, 2, 3 Losbbough-J.
O. B. I. No. 2 Sidney.
O. B. I., No. 30 Swaine.
Foot Press, No. 4 Swaine.
Arch Press, No. 40 Swaine.

**PUNCHES & SHEARS:** PUNCHES & SHEARS: Queen City DE. ½ in ½\*; 24 thr. Cleveland C., SE. ¾ in ¾\*; 26\* thr. No. L-10 Badger. DE, ½ in ½\* No. 14½ W-W., 25\* thrt; m. d. No. 24 Beloit S. E., ¾\* in ¾\*.

#### SHEARS:

Jig, GEM, 18 ga. cap., M.I. Rotary Bevel, Lennox ¾. Square, Stark 9; 18 ga. cap. THREADERS, Pipe & Bolt: Murchey, 3/4" dbl. head, bolt. Pipe, 2" Outer M. D.

#### MISCELLANEOUS

Bender, No. 15 Wallace. Dbl. Seamers, Swain. Compressor, H-B CCB, 14x9x8, Compressor, H-B CCB, 14x'
20 HP motor.
Csroover, 30" Toledo.
Planer, 30"x30"x8" Pease.
Planer, 30"x90"x8" Wheeler.
Metal Band Saw, 14" Racine.
Rolls, 10" Pvramid, 1½" cap.
Saw, cold, Higlev 20"
Shaper, 20" Smith & Mills.
Shaper, 16" Steptoe.

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Barrett No. 2 cyl., 5" bar. Bullard 24" Rapid Production

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P. & W. Nos. 11, 12, 13 Mult. American 2' Radial Morris 4' and 5' Radials, Prentice 6' Radial. Morris 4' and 5' Radials, Prentice 6' Radial, Allen 3, 4, & 6 sp. B.B. Henry & Wright 4 sp. and 6 sp. Avey 4 spindle No. 2. Upright Drills—many makes and

#### GRINDERS

B. & S. Nos. 1, 2, 3, Univ. Bryant Nos. 6, 10A, 18A, S-A, 2 Sp. Hole, No. 40 Chuck. Disc Grind.—All makes & siz. Nort., 6x32", 10x36", 14x50".

#### LATHES

Hendey Lathes-most sizes. Pittsburgh 32"x24', q.c.g.

#### MILLERS

Kempsmith No. 3 Universal. Brown & Sharpe No. 2A Univ.

Cincinnati No. 38 Univ., M.D. Brown & Sharpe No. 3 Universal Van Norman Nos. 2, 20 Univ., Heudey No. 1B Universal, Recker No. 2A Vert., arr. m.d. Becker No. 6 Vert., cone drive. Van Norman Nos. 2, 20 Cm Hendey No. 1B Universal, Becker No. 2A Vert., arr. m. Becker No. 6 Vert., cone di Lincoln Millers of all kinds. P.&W. 6"x14", Thread Mille Milwaukee Cam Millers. Millers.

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Bliss No. 18, 19 & 20 O.B.I. V. & O. No. 12, 14 D.A.C. In. Wat.-F. No. 6 D.A. Pillar Cam. Stoll No. 67, s.s. Ferracuit No. 105 D.A. Terkelsen D.1 159 t. M. Spring. Strand. No. 4-R 8.S. Reducing. W-F Long. Stroke for shells. Ferracuit No. 104 4 str., Overh. W-F Type for cartridges (20).

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Grid. 9/16", 74", 11" Mod. G. Clev. 34", 14", 34", 74", 2", 21", 21", 41" & 51" Auto. B.&S. Auto.—most sizes (we are specialists).

New Brit. 1x5", 15%x7" A. Cone [", 11", 12" Automatic. Hand Screw M. of all makes & sizes; W. & S., Foster, B.&S. Potter & Johnston Nos. 5A, 6A Chuckers.

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Headers, many sizes & makes. Measuring Machines, P.&W.

12", 24" & 48".

Planer—Detrick & Harvey 36"

x 36" x 12' Openside.

Planer -Shaper -Lynd Farquhar

Planer—Shaper—Lynd Farquhar 26" Openside. Rolling Mill, Robertson 12"x12" for non-ferrous metal. Shapers—from 7" to 32". Shear—Niagara 10'-14 Ga. Straighteners—Shuster, for wire, Swagers—12 in stock. Tapper—Threadnut No. 2

auto. nut. Wire Formers, Nilson&Baird.

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| 1-72"   | Colburn-Mtr. DrPRT        |
|---------|---------------------------|
| 1-72"   | N B P-Motor Drive-PRT     |
| 1-62"   | N B P-Motor Drive-PRT     |
| 1-44"   | N B P-Motor Drive-PRT     |
| 2-42"   | Bullard-Mtr. DrPRT        |
| 1-41/2" | N B P-Horiz. D.SM D.      |
| 1-8"    | Beaman & Smith Hor. Fl. T |
| 1-21/4" | Lucas Hor. Tbl. Type-M.D. |
| 1-5"    | N B P Knee Circ. Table    |

#### LATHES

| 1-46"×40"   | N B P-Geared Head    |
|-------------|----------------------|
| 1-36"x24'   | Bridgeford-G. Head   |
| 1-36"x22'   | Bridgeford-G. Head   |
| 1-36"x15"   | Putnam-Geared Head   |
| 1-36"x14"   | N B P-Geared Head    |
| 1-30"x13'6" | N B P-Geared Head    |
| 2-28"x14'6" | Lodge & Shipley-G.H. |
| 1-27"x12'6" | Greaves-G. Head      |
| 1-24"x10'   | Prentice-G. Head     |
| 1-20-x14'   | Walcott-G. Head      |
| 1-20"x12'   | Lodge & Shipley-M.D  |
| 1-20"x10'   | American—G. Head     |
| 1-20"x10'   | Leblond—G. Head      |
| 6-18"x8'    | Prentice-G. Head     |
| 5-16"x8'    | Prentice-G. Head     |
| 1-14"x6'    | Prentice—G. Head     |
| 1-14"x10'   | Hendey-Geared Head   |
| 3-10"v5'    | P & W Prod Lathes    |

#### GEAR CUTTERS

Fellows—No. 6, No. 61, No. 62, No. 65 Barber-Colman—No. 5 S.&D. Spdls. Gould & Eberhardt-60" Gear Cut.

#### MILLERS

| 1-EE-DEJERSON                     |
|-----------------------------------|
| 1-37"x37"x14' Ingersoll Adj. Rail |
| 1-32"x24"x8' Ingersoll Adj. Rail  |
| 2-9" Spin. Ingersoll Facing Mchs. |
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| 2-No. 5C Brown & Sharpe Vert.     |
| 1-No. AB Becker Vertical          |
| 1-No. 4 Hendey Plain              |
| 2-No. 11/2B Brown & Sharpe Plain  |
| 2-No. 1B Brown & Sharpe Plain     |
| 1-No. 3A B. & S. H. D. Univ.      |
| 2-No. 2A B. & S. H. D. Univ.      |
| 1 No. 2YB Brown & Sharpe Plain    |
| 1-No. 1A Milwaukee Plain          |
| 1-No. 1B Milwaukee Plain          |
| 1-No. 3 Garvin Duplex M.D.        |
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#### -

| PLANERS       |                  |
|---------------|------------------|
| 1-48"x48"x16" | N B P-4 Heads    |
| 1-42"x42"x16' | N B P-4 Heads    |
| 1-36"x36"x12" | Bickett-4 Heads  |
| 1-30"x30"x12" | Whitcomb-2 Heads |

#### SHAPERS

| CHALLER | ELEVIS . |    |                |  |
|---------|----------|----|----------------|--|
| 1-28"   | Gould    | 8  | Eberhardt-M.D. |  |
| 1-24"   | Gould    | 8z | Eberhardt-M.D. |  |
| 2-16"   | Gould    | 8z | Eberhardt-M.D. |  |

#### MISCELLANEOUS

500 ton NBP Double Carwheel Press 25%" Gridley Auto. 4 Spin-Type G No. 2 Lapointe D.S. Broach. Mach. No. 2A W. & S. Univ. Turret Lathe No. 3 Bardons & Oliver Tur. Lathe

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1-34" 4-Spindle Gridley Automatic No. 3 LaPointe Broach No. 24 New Britain Chucker

20" Barnes 4-Spdl. A.G.H. Drill

Rockford Horiz. Drilling and Boring Machine with outer support, sliding col. on hd., equipped with 4-spd. A.C. Mtr., tbl. 24"x72"

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52" Gardner Tbl. Type Disc Grinder, M.D. No. 1 Gardner Dbl. End Grinder, M.D.

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24"x16' Prentice A.G.H. Lathe, M.D.

No. 41/2 R. & K. Punch Press 2" Garvin Die Slotter

F. B. Shuster %" cap. Wire Straightener

No. 4 B.SO. Tur. Lathe, A.C., B.F., pwr. feed No. 4 W.S. Tur. Lathe, P.F., to tur., P.F. to cutoff slide

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20° Lever, Wheel & Lever and Power Feed,
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5° Bausch Radial Drill.
9° other drills of various speed.

59 other drills of various sizes and types.
MISCELLANEOUS Brake, Robinson, toggle, 5'. Brakes, 6' and 10' for 18 gauge

Grinders, Bryant deep hole chucking. Grinders, Bryant deep hole chucking.
Broaching machine, No. 1 LaPointe.
24'x 12' South Bend Lathe, with raising blocks,
31 other lathes 10' to 24' swing, 5' to 14' beds.
Milling Machine, Nos. 1½, 3 and 4 plain.
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Planer, 36'x36'x14' Gray Standard Pattern.
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MOTORS, REBUILT 3 Phase ½ to 50 HP various needs Grinders, cutter and cylindrical, plain and univ.

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6" Merrill A.C. Motor Drive Pipe Machine. 4" Catlin Keyseater with large lot extra equipment.

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100-200-and 400-ton 48" Wheel Presses.

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No. 3 Barber-Col., M. D. No. 12 Barber-C., R. T., (9).

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No. 3 Ohio Tool & Cutter. No. 2 LaSalle, No. 2½ Bath-Surface.

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9x20 Porter-Cable-Prod.
14x6 Flather, Q. C. G., T. A.
14x6 Economic, Q. C. G. Colla.
16x8 Monarch, Q. C. G., T. A.
16x10 Flat., Q. C. G., T. A.H.
24x12 Advance, Q. C. G.
MILLING MACHINES
No. 4 Cin. & Brown & S., pl.
No. 5 Becker, vertical.
SCREW MACHINES
(4) No. 0 Brown & S. 9x20 Porter-Cable-Prod.

(4) No. 0 Brown & S. auto. Model G. Gridley auto.

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SHAPEND
17\* Economic Single Gear.
24\* Walcott-Helical back gr.
28\* Amer. B. C., Hvv. Duty
SHEARS and BRAKES
4\* Streine, 10 Ga. Capacity.
10\* Niagara, 10 ga. 13\* gap.
6\* Dreia & Krump, 16 ga.
8\* Dreia & Krump, 16 ga. cap
MISCELLANEOUS
Parage all sizes.

Punch Presses, all sizes. No. 6 Wells wire st. & cut. 6 Williams pipe machine.

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Cleveland 14" Model "A Gridley 1" 4-spdl. Model Brown & Sharpe No. 00 Sharpe 00

Brown & Sharpe No. 00 DRILLS & RADIALS Cincinnati-Bickford 4' Fosdick 3' and 24' Niles 6' Universal Silver 34' Plain Carlton 3' Sensitive Carlton 3' Sensitive
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12x5; 12x6; 14x6 Grd.; 14x G Tie Bar; 14x6 Tie Bar & Taper; 14x10 Grd.; 16x6 Tie Bar; 16x G Tie Bar & Taper.

#### LATHES

Warner & Swasey No. 2A Turret Boye & Emmes 32x14 Cone, LeBlond 14x8; 14x6; 19x8 American 20x8 Grd. Hd.; 16x Cone N Cone Lodge & Shipley 14x6; 16x6; 16x8; 18x8; 24x16' Monarch 14x6; 16x6; 18x10

#### HYDRAULIC WHEEL PRESS

350-ton cap.; 54" between Rods 17' dist. Ram to Rods 17' Resistance.

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No. 465 Bliss; 8'x\sum\_eap.
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No. 136 Stoll; 36"x16ga.cap.
No. 142 Stoll Squaring; 42"x 16

748 Niagara Grd. 0 iven, M.D. 48"x3/16 No driven,

#### STEEL POWER BRAKE

K Apron Bending capacity.

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GRINDERS
12" Heald Rotary
14x50 Norton Plain
6x20 Landis Universal
Nos. 2 & 2 | Bath Univ,
No. 3 Abrasive Surface
12x36 PAW Vertical
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#### MILLERS

Brown & Sharpe No. 14, Pl. Cincinnati Nos. 4; 3; 14, Hendey-Norton No. 3; Univ. Kempsmith Nos. 3; 2; and 1 Ohio No. 3; No. 2 Cniversal B. & S. No. 3 Univ. Garvin No. 2 & 2A Universal Rockford No. 2 Triversal Brown & Sharpe No. 13-B

#### MISCELLANEOUS

W&W Multi Punch, 10' Whiton Gear Cutter No. 2

#### HENDEY SHAPER 24" cap.; Motor Drive; Gear Box. Very late type

Abrasive No. 3 Surf. Grinder Norton 14x50 Grinder Pease 36" Blue Printer Blue Pease 36" Blue Printer Nilson 4-slide Wire Former Electric Lift Truck 4000 lbs. Rolling Mill 22"x12" FAR-Rolling RELL

Niagara 42" Power Folder Miner 400 lb. Drop Hammer Leveller Rolls 60"; 7 rolls

#### CENTERLESS GRINDER

o. 3 Cincinnati; Large Type Motor Drive. Serial No. B-436-A

#### AUTOMATIC PIN GRINDER Arter No. 132 Self-contd.

Bliss No. 18; 19; 19C; 20; Mo 21; 21; OBI stock. 21;

V&O No. 1; No. 24; No. 3; No. 34 OBI Baxendale No. 4 OBI (15) Niagara No. 3; No. 4 Grd. (6) Toledo No. 75; No. 14 Toledo 250-ton Coining Press Toledo 100-ton Coining Prov. & O. No. 12 D.A. Dial

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Perkins No. 50 Dble, Crank Billings & Spencer No. 2 Trimming Stoll No. 138-B Dble. Crank Stoll No. 79-B Dble. Crank

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williams & White 10-6" bed; 7" shaft; 2½" str.; 150-ton. Weight 38,000 ibs. Motor Drive. BORING MILL 54" Colburn; Vertical Bor-ing and Turning Mill; Arr. Motor Drive.

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Motors and Generators, large

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  No. 10 Waterbury Farrel D.S.S.D. High Speed
  No. 1 Waterbury Farrel D.S.S.D. Code C2241
  No. 23 Waterbury Farrel D.S.D. Code 14943
  No. 24 Waterbury Farrel D.S.D. Grd. Code 14943
  No. 34 Water Far. D.S.D. Grd. Code 13544
  —No. 11 W. F. L. S.D. Grd. Code 13584
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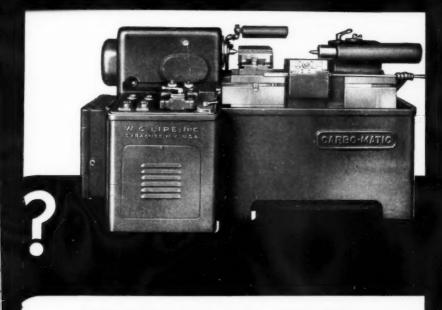
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